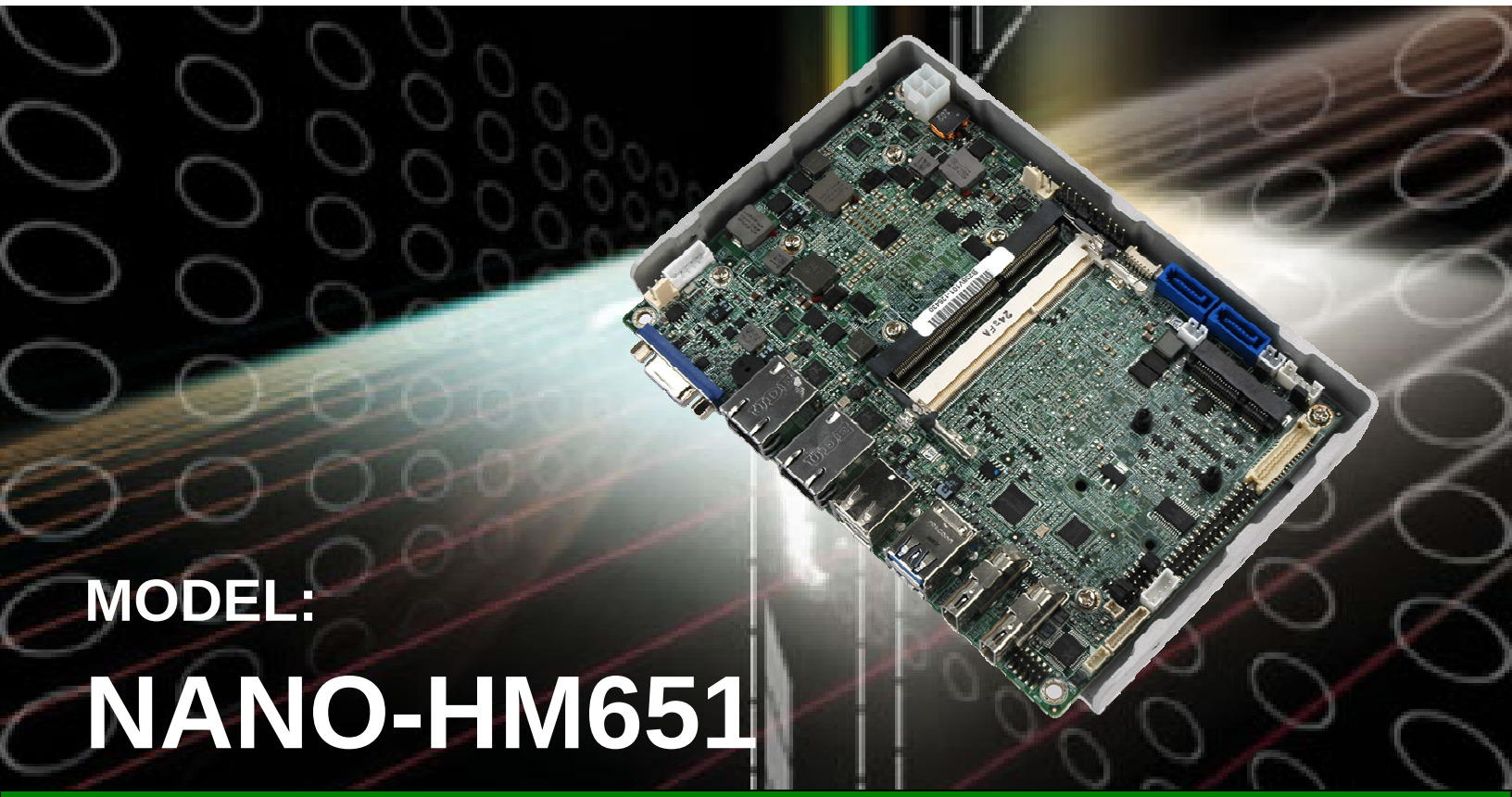
IEI Technology Corp.



MODEL:

NANO-HM651

EPIC SBC with Intel® Celeron® 847E Dual-Core CPU and Intel® HM65 Chipset, DDR3, VGA, HDMI, USB 3.0, Dual PCIe GbE, SATA 6Gb/s, HD Audio, RoHS Compliant

User Manual

Rev. 1.00 – 10 September, 2012

RoHS Lead Free

Revision

Date	Version	Changes
10 September, 2012	1.00	Initial release

Copyright

COPYRIGHT NOTICE

The information in this document is subject to change without prior notice in order to improve reliability, design and function and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

TRADEMARKS

All registered trademarks and product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective owners.

Table of Contents

1 INTRODUCTION 1

1.1 INTRODUCTION 2
1.2 CONNECTORS 3
1.3 DIMENSIONS 4
1.4 DATA FLOW 5
1.5 TECHNICAL SPECIFICATIONS 6

2 UNPACKING 8

2.1 ANTI-STATIC PRECAUTIONS 9
2.2 UNPACKING PRECAUTIONS 9
2.3 UNPACKING CHECKLIST 10
2.3.1 Package Contents 10
2.3.2 Optional Items 11

3 CONNECTORS 12

3.1 PERIPHERAL INTERFACE CONNECTORS 13
3.1.1 NANO-HM651 Layout 13
3.1.2 Peripheral Interface Connectors 14
3.1.3 External Interface Panel Connectors 15
3.2 INTERNAL PERIPHERAL CONNECTORS 15
3.2.1 Audio Connector 15
3.2.2 Battery Connector 16
3.2.3 Digital Input/Output (DIO) Connector 17
3.2.4 Debug Connector 18
3.2.5 Fan Connector (CPU) 19
3.2.6 Fan Connector (System) 19
3.2.7 Front Panel Connector 20
3.2.8 LVDS Backlight Inverter Connector 21
3.2.9 Keyboard/Mouse Connector 22
3.2.10 LVDS LCD Connector 23
3.2.11 PCIe Mini Card Slot 24

3.2.12 Power Connector *26*
3.2.13 SATA 6Gb/s Connector *27*
3.2.14 SATA Power Connectors *28*
3.2.15 Serial Port Connectors (COM 1 and COM 2) *28*
3.2.16 Serial Port Connector (COM3) *29*
3.2.17 SMBus Connector *30*
3.2.18 SPI Flash Connector *31*
3.3 EXTERNAL PERIPHERAL INTERFACE CONNECTOR PANEL 32
3.3.1 Ethernet Connectors *33*
3.3.2 HDMI Connectors *34*
3.3.3 USB 2.0 Connectors *34*
3.3.4 USB 3.0 Connectors *35*
3.3.5 VGA Connector *36*

4 INSTALLATION 37

4.1 ANTI-STATIC PRECAUTIONS 38
4.2 INSTALLATION CONSIDERATIONS 39
4.3 SO-DIMM INSTALLATION 40
4.4 PCIE MINI CARD INSTALLATION 41
4.5 HEAT SINK ENCLOSURE 41
4.6 JUMPER SETTINGS 43
4.6.1 AT/ATX Power Mode Select Jumper *43*
4.6.2 Clear CMOS Jumper *44*
4.6.3 LVDS Voltage Selection Jumper *45*
4.6.4 LVDS Panel Resolution Selection Jumper *46*
4.6.5 TPM Setting Jumper *47*
4.6.6 Flash Descriptor Security Override Jumper *48*
4.7 CHASSIS INSTALLATION 49
4.7.1 Airflow *49*
4.7.2 Motherboard Installation *49*
4.8 INTERNAL PERIPHERAL DEVICE CONNECTIONS 50
4.8.1 AT Power Connection *50*
4.8.2 Audio Kit Installation *52*
4.8.3 SATA Drive Connection *53*
4.8.4 Single RS-232 Cable *54*

4.8.5 USB Cable (Optional) *55*
4.9 EXTERNAL PERIPHERAL INTERFACE CONNECTION 56
4.9.1 HDMI Display Device Connection *57*
4.9.2 LAN Connection *58*
4.9.3 USB Connection *58*
4.9.4 VGA Monitor Connection *59*
4.10 SOFTWARE INSTALLATION 60

5 BIOS SCREENS 62

5.1 INTRODUCTION 63
5.1.1 Starting Setup *63*
5.1.2 Using Setup *63*
5.1.3 Getting Help *64*
5.1.4 Unable to Reboot After Configuration Changes *64*
5.1.5 BIOS Menu Bar *64*
5.2 MAIN 65
5.3 ADVANCED 66
5.3.1 ACPI Settings *66*
5.3.2 Trusted Computing *67*
5.3.3 CPU Configuration *68*
5.3.4 SATA Configuration *70*
5.3.5 USB Configuration *71*
5.3.6 Super IO Configuration *72*
5.3.6.1 Serial Port n Configuration 72
5.3.7 H/W Monitor *76*
5.3.7.1 Smart Fan Mode Configuration 78
5.3.8 Serial Port Console Redirection *79*
5.3.9 Sandybridge DTS Configuration *81*
5.4 CHIPSET 82
5.4.1 NorthBridge Configuration *83*
5.4.1.1 Graphics Configuration 84
5.4.2 Southbridge Configuration *86*
5.5 BOOT 88
5.6 SECURITY 90
5.7 EXIT 91

A BIOS OPTIONS 93

B ONE KEY RECOVERY 96

B.1 ONE KEY RECOVERY INTRODUCTION 97
B.1.1 System Requirement 98
B.1.2 Supported Operating System 99
B.2 SETUP PROCEDURE FOR WINDOWS 100
B.2.1 Hardware and BIOS Setup 101
B.2.2 Create Partitions 101
B.2.3 Install Operating System, Drivers and Applications 105
B.2.4 Building the Recovery Partition 106
B.2.5 Create Factory Default Image 108
B.3 AUTO RECOVERY SETUP PROCEDURE 113
B.4 SETUP PROCEDURE FOR LINUX 118
B.5 RECOVERY TOOL FUNCTIONS 121
B.5.1 Factory Restore 123
B.5.2 Backup System 124
B.5.3 Restore Your Last Backup 125
B.5.4 Manual 126
B.6 RESTORE SYSTEMS FROM A LINUX SERVER THROUGH LAN 127
B.6.1 Configure DHCP Server Settings 128
B.6.2 Configure TFTP Settings 129
B.6.3 Configure One Key Recovery Server Settings 130
B.6.4 Start the DHCP, TFTP and HTTP 131
B.6.5 Create Shared Directory 131
B.6.6 Setup a Client System for Auto Recovery 132
B.7 OTHER INFORMATION 135
B.7.1 Using AHCI Mode or ALi M5283 / VIA VT6421A Controller 135
B.7.2 System Memory Requirement 137

C TERMINOLOGY 138

D DIGITAL I/O INTERFACE 142

D.1 INTRODUCTION 143
D.2 DIO CONNECTOR PINOUTS 143
D.3 ASSEMBLY LANGUAGE SAMPLES 144

D.3.1 Enable the DIO Input Function 144
D.3.2 Enable the DIO Output Function 144

E WATCHDOG TIMER 145

F HAZARDOUS MATERIALS DISCLOSURE 148

F.1 HAZARDOUS MATERIALS DISCLOSURE TABLE FOR IPB PRODUCTS CERTIFIED AS ROHS COMPLIANT UNDER 2002/95/EC WITHOUT MERCURY 149

List of Figures

Figure 1-1: NANO-HM651 EPIC SBC 2
Figure 1-2: Connectors 3
Figure 1-3: NANO-HM651 Dimensions (mm) 4
Figure 1-4: Data Flow Block Diagram 5
Figure 3-1: Connector and Jumper Locations 13
Figure 3-2: Audio Connector Location 16
Figure 3-3: Battery Connector Location 16
Figure 3-4: DIO Connector Location 17
Figure 3-5: EC Debug Connector Location 18
Figure 3-6: CPU Fan Connector Location 19
Figure 3-7: System Fan Connector Location 20
Figure 3-8: Front Panel Connector Location 21
Figure 3-9: Backlight Inverter Connector Location 22
Figure 3-10: Keyboard/Mouse Connector Location 23
Figure 3-11: LVDS Connector Location 24
Figure 3-12: PCIe Mini Card Slot Location 25
Figure 3-13: CPU Power Connector Location 26
Figure 3-14: SATA Drive Connector Locations 27
Figure 3-15: SATA Power Connector Locations 28
Figure 3-16: COM Connector Locations 29
Figure 3-17: Serial Port Connector Location 30
Figure 3-18: SMBus Connector Location 31
Figure 3-19: SPI Flash Connector Location 32
Figure 3-20: NANO-HM651 External Peripheral Interface Connector 32
Figure 3-21: RJ-45 Ethernet Connector 33
Figure 3-22: HDMI Connector 34
Figure 3-23: VGA Connector 36
Figure 4-1: SO-DIMM Installation 40
Figure 4-2: PCIe Mini Card Installation 41
Figure 4-3: Heat Sink Retention Screws 42

Figure 4-4: AT/ATX Power Mode Jumper Location 44
Figure 4-5: Clear CMOS Jumper 45
Figure 4-6: LVDS Voltage Selection Jumper Location 46
Figure 4-7: LVDS Screen Resolution Jumper Locations 47
Figure 4-8: TPM Setting Jumper Location 48
Figure 4-9: Flash Descriptor Security Override Jumper Location 49
Figure 4-10: Power Cable to Motherboard Connection 51
Figure 4-11: Connect Power Cable to Power Supply 52
Figure 4-12: Audio Kit Cable Connection 53
Figure 4-13: SATA Drive Cable Connection 54
Figure 4-14: Single RS-232 Cable Installation 55
Figure 4-15: Dual USB Cable Connection 56
Figure 4-16: HDMI Connection 57
Figure 4-17: LAN Connection 58
Figure 4-18: USB Connector 59
Figure 4-19: VGA Connector 60
Figure 4-20: Introduction Screen 61
Figure 4-21: Available Drivers 61
Figure B-1: IEI One Key Recovery Tool Menu 97
Figure B-2: Launching the Recovery Tool 102
Figure B-3: Recovery Tool Setup Menu 102
Figure B-4: Command Prompt 103
Figure B-5: Partition Creation Commands 104
Figure B-6: Launching the Recovery Tool 106
Figure B-7: Manual Recovery Environment for Windows 106
Figure B-8: Building the Recovery Partition 107
Figure B-9: Press Any Key to Continue 107
Figure B-10: Press F3 to Boot into Recovery Mode 108
Figure B-11: Recovery Tool Menu 108
Figure B-12: About Symantec Ghost Window 109
Figure B-13: Symantec Ghost Path 109
Figure B-14: Select a Local Source Drive 110
Figure B-15: Select a Source Partition from Basic Drive 110
Figure B-16: File Name to Copy Image to 111
Figure B-17: Compress Image 111

Figure B-18: Image Creation Confirmation 112
Figure B-19: Image Creation Complete 112
Figure B-20: Image Creation Complete 112
Figure B-21: Press Any Key to Continue 113
Figure B-22: Auto Recovery Utility 114
Figure B-23: Disable Automatically Restart 114
Figure B-24: Launching the Recovery Tool 115
Figure B-25: Auto Recovery Environment for Windows 115
Figure B-26: Building the Auto Recovery Partition 116
Figure B-27: Factory Default Image Confirmation 116
Figure B-28: Image Creation Complete 117
Figure B-29: Press any key to continue 117
Figure B-30: Partitions for Linux 119
Figure B-31: Manual Recovery Environment for Linux 120
Figure B-32: Access menu.lst in Linux (Text Mode) 120
Figure B-33: Recovery Tool Menu 121
Figure B-34: Recovery Tool Main Menu 122
Figure B-35: Restore Factory Default 123
Figure B-36: Recovery Complete Window 123
Figure B-37: Backup System 124
Figure B-38: System Backup Complete Window 124
Figure B-39: Restore Backup 125
Figure B-40: Restore System Backup Complete Window 125
Figure B-41: Symantec Ghost Window 126
Figure B-42: Disable Automatically Restart 133

List of Tables

Table 1-1: Technical Specifications 7
Table 3-1: Peripheral Interface Connectors 14
Table 3-2: Rear Panel Connectors 15
Table 3-3: Audio Connector Pinouts 16
Table 3-4: Battery Connector Pinouts 17
Table 3-5: DIO Connector Connector Pinouts 17
Table 3-6: Debug Connector Pinouts 18
Table 3-7: CPU Fan Connector Pinouts 19
Table 3-8: System Fan Connector Pinouts 20
Table 3-9: Front Panel Connector Pinouts 21
Table 3-10: Backlight Inverter Connector Pinouts 22
Table 3-11: Keyboard/Mouse Connector Pinouts 23
Table 3-12: LVDS Connector Pinouts 24
Table 3-13: PCIe Mini Card Slot Pinouts 26
Table 3-14: CPU Power Connector Pinouts 27
Table 3-15: SATA Drive Connector Pinouts 27
Table 3-16: SATA Power Connector Pinouts 28
Table 3-17: COM Connector Pinouts 29
Table 3-18: Serial Port Connector Pinouts 30
Table 3-19: DB-9 RS-422/485 Pinouts 30
Table 3-20: SMBus Connector Pinouts 31
Table 3-21: SPI Flash Connector 32
Table 3-22: LAN Pinouts 33
Table 3-23: RJ-45 Ethernet Connector LEDs 33
Table 3-24: HDMI Connector Pinouts 34
Table 3-25: USB 2.0 Port Pinouts 35
Table 3-26: USB 3.0 Port Pinouts 35
Table 3-27: VGA Connector Pinouts 36
Table 4-1: Jumpers 43
Table 4-2: AT/ATX Power Mode Jumper Settings 44

Table 4-3: Clear CMOS Jumper Settings 45
Table 4-4: LVDS Voltage Selection Jumper Settings 46
Table 4-5: LVDS Screen Resolution Jumper Settings 47
Table 4-6: TPM Setting Jumper Settings 48
Table 4-7: Flash Descriptor Security Override Jumper Settings 48
Table 5-1: BIOS Navigation Keys 64

BIOS Menus

BIOS Menu 1: Main 65
BIOS Menu 2: Advanced 66
BIOS Menu 3: ACPI Configuration 67
BIOS Menu 4: TPM Configuration 68
BIOS Menu 5: CPU Configuration 69
BIOS Menu 6: SATA Configuration 70
BIOS Menu 7: USB Configuration 71
BIOS Menu 8: Super IO Configuration 72
BIOS Menu 9: Serial Port n Configuration Menu 72
BIOS Menu 10: H/W Monitor 77
BIOS Menu 11: Smart Fan Mode Configuration 78
BIOS Menu 12: Serial Port Console Redirection 80
BIOS Menu 13: IEI Feature 81
BIOS Menu 14: Chipset 82
BIOS Menu 15:Northbridge Configuration 83
BIOS Menu 16:Graphics Configuration 84
BIOS Menu 17: Southbridge Chipset Configuration 86
BIOS Menu 18: Boot 88
BIOS Menu 19: Security 90
BIOS Menu 20:Exit 91
BIOS Menu 21: IEI Feature 118

Chapter

1

Introduction

1.1 Introduction

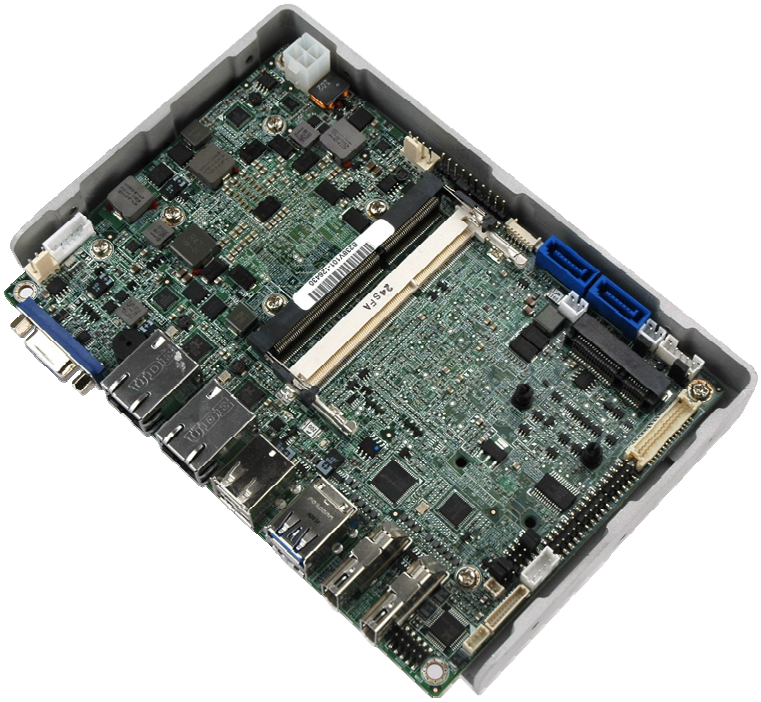


Figure 1-1: NANO-HM651 EPIC SBC

The NANO-HM651 EPIC SBC is an Intel® Celeron® dual-core processor 847E platform. The NANO-HM651 supports two 204-pin 1066/1333 MHz dual-channel DDR3 SDRAM SO-DIMMs (system max. 8.0 GB). The board includes one VGA connector and two HDMI ports supporting a dual-display configuration.

Storage on the board is handled by two SATA 6Gb/s ports for connecting a hard drive, optical drive or SSD. The PCIe Mini slot allows an mSATA card to be installed.

The NANO-HM651 also comes with two Gigabit Ethernet (GbE) connectors, two USB 3.0 connectors and two USB 2.0 connectors. Serial device connectivity is provided by two internal RS-232 connectors and one internal RS-422/485 connector.

1.2 Connectors

The connectors on the NANO-HM651 are shown in the figure below.

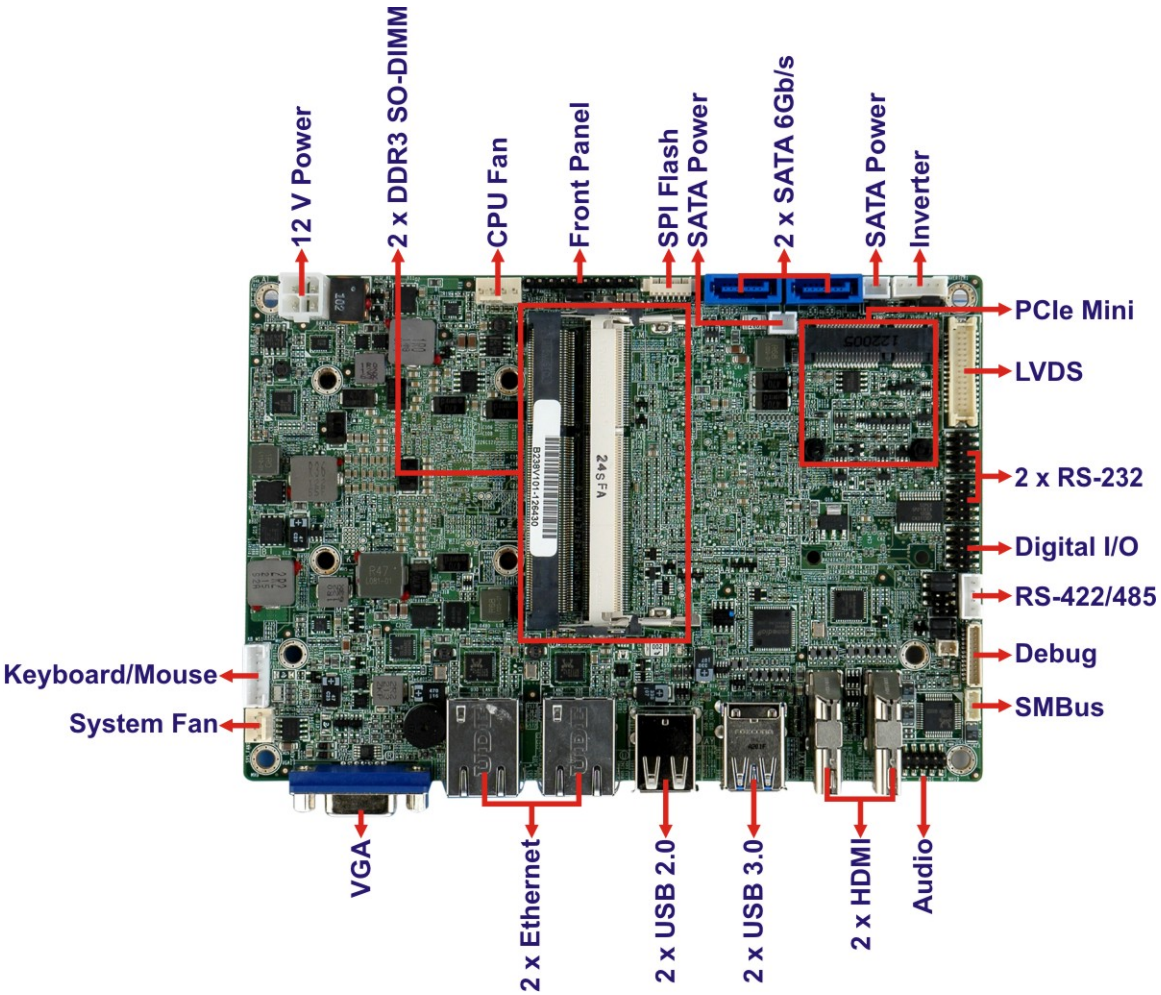


Figure 1-2: Connectors

1.3 Dimensions

The dimensions of the board are listed below:

- **Length**: 115 mm
- **Width**: 165 mm

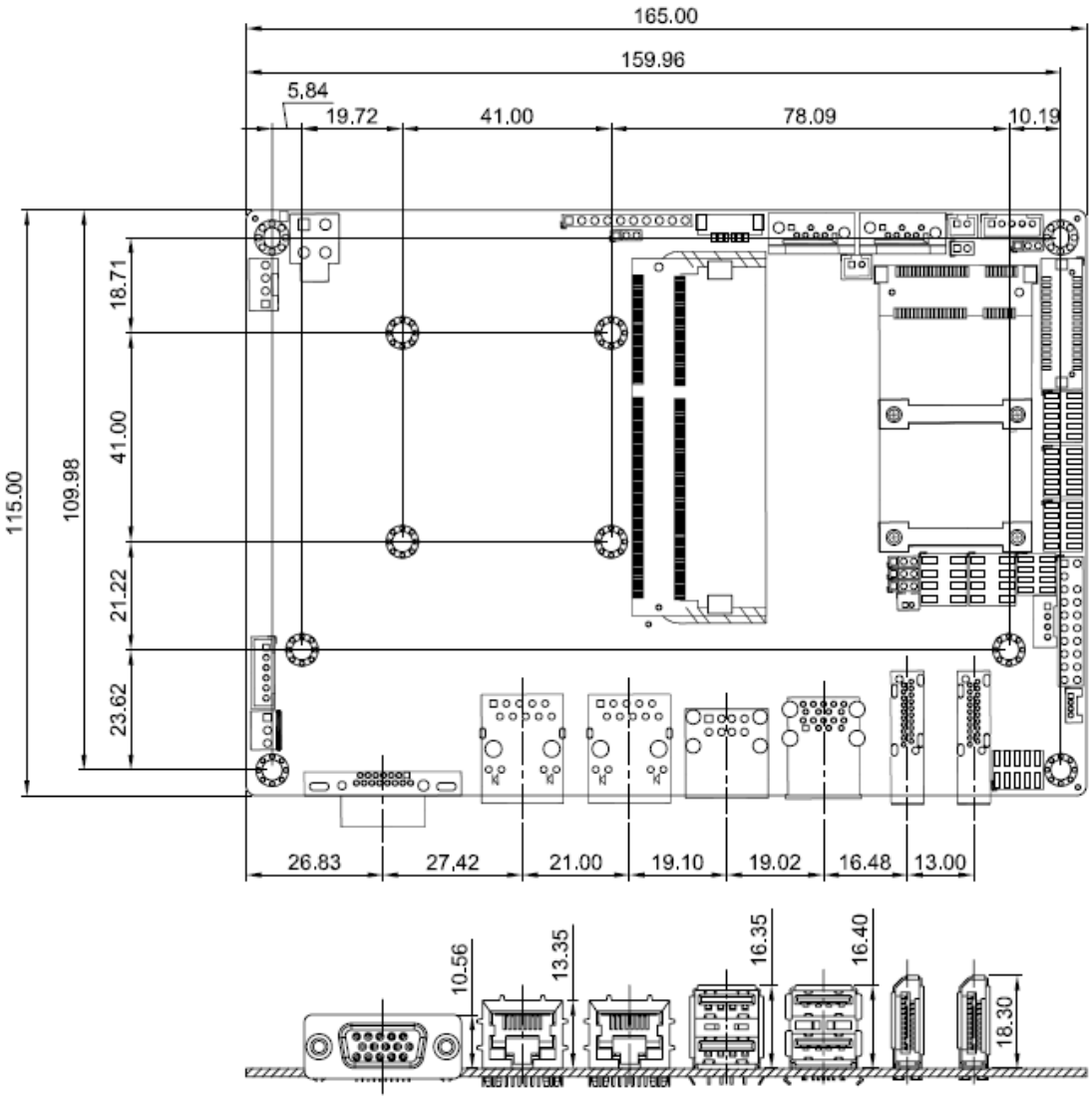


Figure 1-3: NANO-HM651 Dimensions (mm)

1.4 Data Flow

Figure 1-4 shows the data flow between the two on-board chipsets and other components installed on the motherboard and described in the following sections of this chapter.

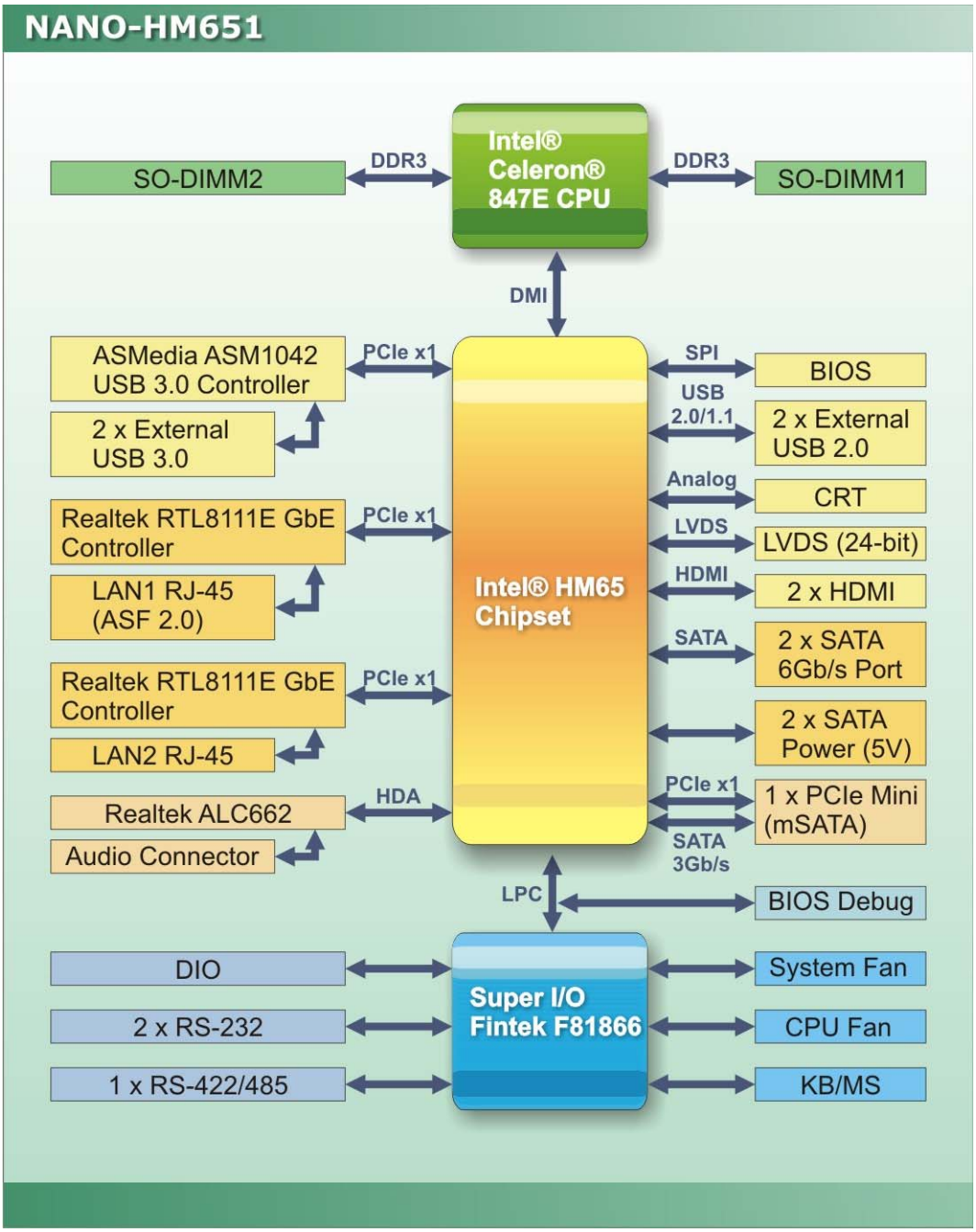


Figure 1-4: Data Flow Block Diagram

1.5 Technical Specifications

NANO-HM651 technical specifications are listed in table below.

Specification	NANO-HM651
Form Factor	EPIC
CPU Options	Intel® Celeron® dual-core 847E processor 1.1GHz
System Chipset	Intel® HM65
Graphics Engine	Intel® HD Graphics Gen 6 support for DX10.1 and OpenGL 3.0 Full MPEG2, VC1, AVC Decode
Memory	Two 204-pin SO-DIMM sockets support two 1333/1066 MHz dual-channel DDR3 SDRAM SO-DIMM (system max. 8 GB)
Ethernet Controller	Two Realtek RTL8111E PCIe GbE controllers with ASF2.0 support
BIOS	UEFI BIOS
Super I/O	Fintek F81866
Digital I/O	8-bit digital I/O (4-bit input, 4-bit output)
Audio Codec	Realtek ALC662 HD Audio codec
Watchdog Timer	Software programmable supports 1~255 sec. system reset
Expansion	
PCIe	One PCIe Mini slot with mSATA support
I/O Interface Connectors	
Display	VGA and LVDS integrated in Intel® HM65: - One VGA port (2048 x 1536@75Hz) - 24-bit dual-channel LVDS (up to 1920 x 1200@60Hz) Two HDMI ports (up to 1920 x 1200@60Hz)
Ethernet	Two RJ-45 GbE ports
Audio	One internal audio connector supports line-out, line-in and mic-in
Serial Ports	Two RS-232 serial ports via internal 10-pin header One RS-422/485 serial ports via internal 4-pin wafer

Specification	NANO-HM651
USB Ports	Two external USB 2.0 ports Two external USB 3.0 ports (via ASMedia ASM1042 USB 3.0 extended host controller)
Keyboard/Mouse	One keyboard and mouse connector via internal 6-pin header
SMBus	One 4-pin wafer connector
Fan	One 4-pin wafer CPU fan connector One 3-pin wafer system fan connector
Storage	
Serial ATA	Two SATA 6Gb/s ports with 5V power connectors
Environmental and Power Specifications	
Power Supply	12 V, AT/ATX power support
Power Consumption	12V@3.01A (Intel® Celeron® with 4GB 1333MHz DDR3 memory)
Operating Temperature	-10°C~60°C
Storage Temperature	-20°C~70°C
Humidity	5% ~ 95% (non-condensing)
Physical Specifications	
Dimensions (LxW)	115 mm x 165 mm
Weight GW/NW	850g/350g

Table 1-1: Technical Specifications

Chapter

2

Unpacking

2.1 Anti-static Precautions

WARNING!

Static electricity can destroy certain electronics. Make sure to follow the ESD precautions to prevent damage to the product, and injury to the user.

Make sure to adhere to the following guidelines:

- ***Wear an anti-static wristband***: Wearing an anti-static wristband can prevent electrostatic discharge.
- ***Self-grounding***: Touch a grounded conductor every few minutes to discharge any excess static buildup.
- ***Use an anti-static pad***: When configuring any circuit board, place it on an anti-static mat.
- ***Only handle the edges of the PCB***: Don't touch the surface of the motherboard. Hold the motherboard by the edges when handling.

2.2 Unpacking Precautions

When the NANO-HM651 is unpacked, please do the following:

- Follow the antistatic guidelines above.
- Make sure the packing box is facing upwards when opening.
- Make sure all the packing list items are present.

2.3 Unpacking Checklist

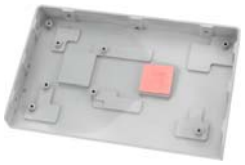
NOTE:

If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the NANO-HM651 was purchased from or contact an IEI sales representative directly by sending an email to sales@iei.com.tw.

2.3.1 Package Contents

The NANO-HM651 is shipped with the following components:

Quantity	Item and Part Number	Image
1	NANO-HM651 SBC	
1	SATA and power cable (**P/N:** 32801-000201-100-RS)	
1	AT 12V cable (**P/N**: 32100-087100-RS)	
2	RS-232 cable (P/N : 32200-000049-RS)	
1	Audio cable (**P/N:** 32000-072100-RS)	

1	Enclosure heatsink	
1	Mini jumper pack	
1	Utility CD	
1	One Key Recovery CD	
1	Quick Installation Guide	

2.3.2 Optional Items

The following component is optional:

Item and Part Number	Image
Dual USB cable (wo bracket) (**P/N**: 32000-070301-RS)	

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

Section 3.1.1 shows peripheral interface connector locations. **Section 3.2** lists all the peripheral interface connectors seen in **Section 3.1.1**.

3.1.1 NANO-HM651 Layout

Figure 3-1 shows the on-board peripheral connectors, rear panel peripheral connectors and on-board jumpers.

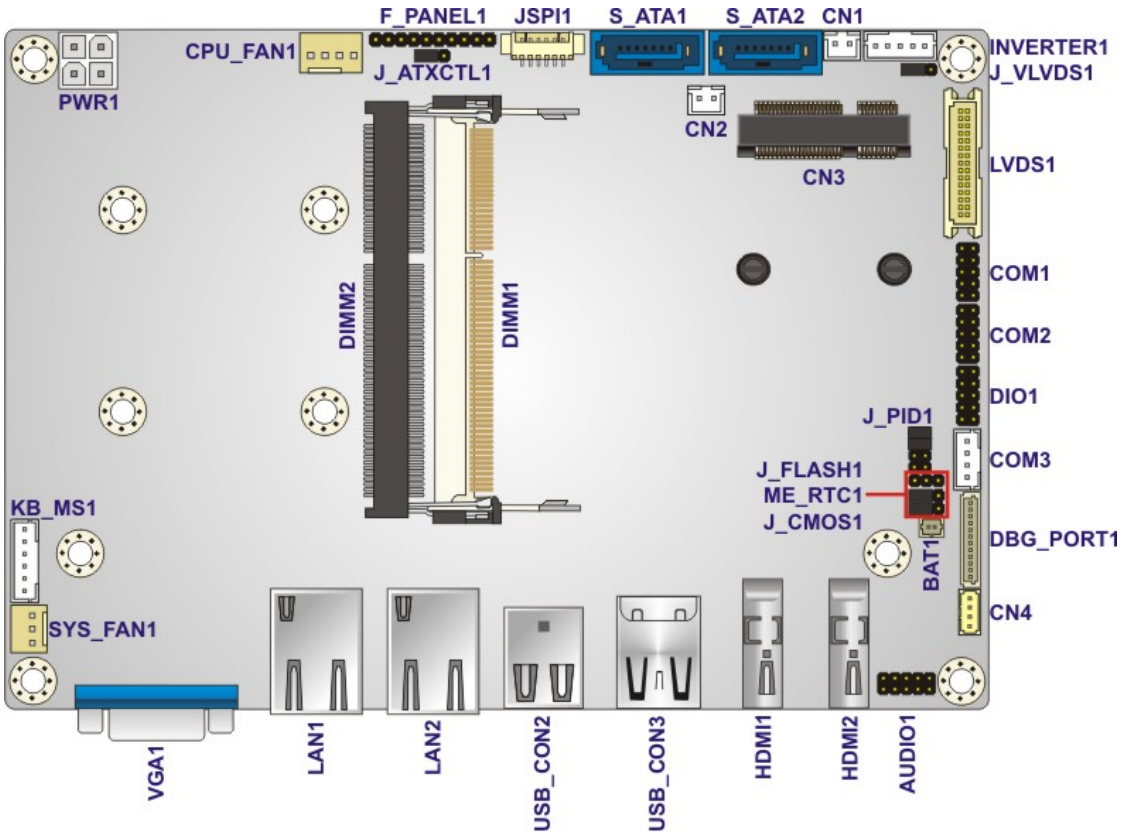


Figure 3-1: Connector and Jumper Locations

3.1.2 Peripheral Interface Connectors

Table 3-1 shows a list of the peripheral interface connectors on the NANO-HM651. Detailed descriptions of these connectors can be found below.

Connector	Type	Label
Audio connector	10-pin header	AUDIO1
Battery connector	2-pin wafer	BAT1
DDR3 SO-DIMM	204-pin SO-DIMM	DIMM1, DIMM2
Digital input/output (DIO) connector	10-pin header	DIO1
Debug port	12-pin connector	DBG_PORT1
Fan connector (CPU)	4-pin wafer	CPU_FAN1
Fan connector (system)	3-pin wafer	SYS_FAN1
Front panel connector	10-pin header	F_PANEL1
Inverter connector	5-pin wafer	INVERTER1
Keyboard and mouse connector	6-pin wafer	KB_MS1
LVDS connector	30-pin crimp	LVDS1
PCIe Mini connector	52-pin PCIe Mini slot	CN3
Power connector	4-pin connector	PWR1
SATA 6Gb/s connectors	7-pin SATA	S_ATA1, S_ATA2
SATA power connectors	2-pin wafer	CN1, CN2
Serial port connectors (RS-232)	10-pin header	COM1, COM2
Serial port connector (RS-422/485)	4-pin wafer	COM3
SMBus connector	4-pin wafer	CN4
SPI flash connector	8-pin wafer	JSPI1

Table 3-1: Peripheral Interface Connectors

3.1.3 External Interface Panel Connectors

Table 3-2 lists the rear panel connectors on the NANO-HM651. Detailed descriptions of these connectors can be found in **Section 3.3** on **page 32**.

Connector	Type	Label
Ethernet connectors	RJ-45	LAN1, LAN2
HDMI connectors	HDMI	HDMI1, HDMI2
USB 2.0 ports	USB port	USB_CON2
USB 3.0 ports	USB port	USB_CON3
VGA port connector	15-pin female	VGA1

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

Internal peripheral connectors are found on the CPU card and are only accessible when the CPU card is outside of the chassis. This section has complete descriptions of all the internal, peripheral connectors on the NANO-HM651.

3.2.1 Audio Connector

CN Label: **AUDIO1**

CN Type: 10-pin header (2x5)

CN Location: See **Figure 3-2**

CN Pinouts: See **Table 3-3**

The 10-pin audio connector is connected to external audio devices including speakers and microphones for the input and output of audio signals to and from the system.

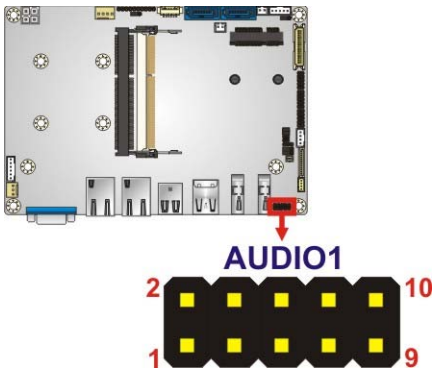


Figure 3-2: Audio Connector Location

Pin	Description	Pin	Description
1	LFRONT-R	2	LLINE-R
3	GND	4	GND
5	LFRONT-L	6	LLINE-L
7	GND	8	GND
9	LMIC1-CONN-R	10	LMIC1-CONN-L

Table 3-3: Audio Connector Pinouts

3.2.2 Battery Connector

CN Label: **BAT1**

CN Type: 2-pin wafer (1x2)

CN Location: See **Figure 3-3**

CN Pinouts: See **Table 3-4**

This is connected to the system battery. The battery provides power to the system clock to retain the time when power is turned off.

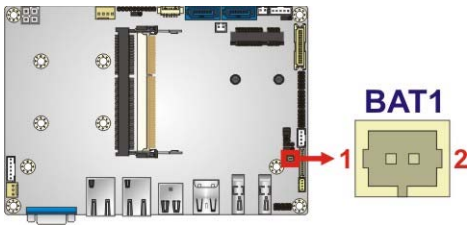


Figure 3-3: Battery Connector Location

Pin	Description
1	Battery+
2	Ground

Table 3-4: Battery Connector Pinouts

3.2.3 Digital Input/Output (DIO) Connector

CN Label: **DIO1**

CN Type: 10-pin header (2x5)

CN Location: See **Figure 3-4**

CN Pinouts: See **Table 3-5**

The digital input/output connector is managed through a Super I/O chip. The DIO connector pins are user programmable.

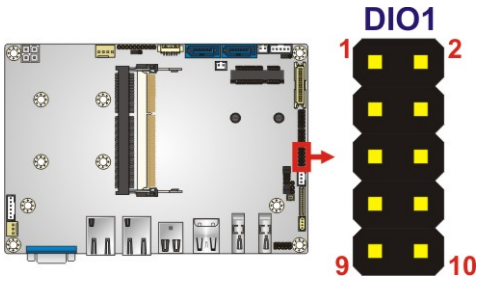


Figure 3-4: DIO Connector Location

Pin	Description	Pin	Description
1	GND	2	+5V
3	Output 3	4	Output 2
5	Output 1	6	Output 0
7	Input 3	8	Input 2
9	Input 1	10	Input 0

Table 3-5: DIO Connector Connector Pinouts

3.2.4 Debug Connector

CN Label:	**DBG_PORT1**
CN Type:	12-pin connector (1x12)
CN Location:	See **Figure 3-5**
CN Pinouts:	See **Table 3-6**

The debug connector connects to a debug card for debugging.

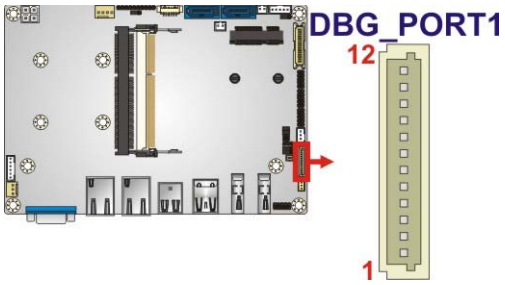


Figure 3-5: EC Debug Connector Location

Pin	Description
1	+V5S
2	+V3.3S
3	GND
4	INT_SERIRQ
5	LPC_AD3
6	LPC_AD2
7	LPC_AD1
8	LPC_AD0
9	LPC_FRAME#
10	BUF_PLT_RST#
11	CLK_PCI_TPM
12	GND

Table 3-6: Debug Connector Pinouts

3.2.5 Fan Connector (CPU)

CN Label: **CPU_FAN1**

CN Type: 4-pin wafer (1x4)

CN Location: See **Figure 3-6**

CN Pinouts: See **Table 3-7**

The cooling fan connector provides a 12V, 500mA current to the cooling fan. The connector has a "rotation" pin to get rotation signals from fans and notify the system so the system BIOS can recognize the fan speed. Please note that only specified fans can issue the rotation signals.

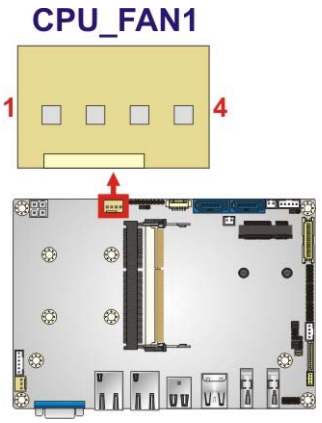


Figure 3-6: CPU Fan Connector Location

Pin	Description
1	GND
2	+12V
3	Rotation Signal
4	PWM Control Signal

Table 3-7: CPU Fan Connector Pinouts

3.2.6 Fan Connector (System)

CN Label: **SYS_FAN1**

CN Type: 3-pin wafer (1x3)

CN Location: See **Figure 3-7**

CN Pinouts: See **Table 3-8**

The cooling fan connector provides a 12V, 500mA current to the cooling fan. The connector has a "rotation" pin to get rotation signals from fans and notify the system so the system BIOS can recognize the fan speed. Please note that only specified fans can issue the rotation signals.

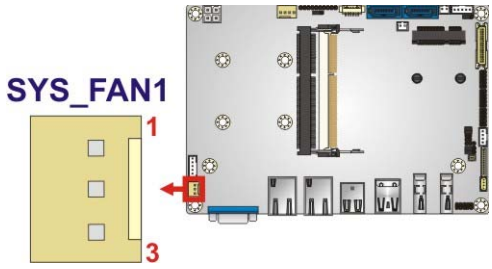


Figure 3-7: System Fan Connector Location

Pin	Description
1	Rotation Signal
2	+12V
3	GND

Table 3-8: System Fan Connector Pinouts

3.2.7 Front Panel Connector

CN Label: **F_PANEL1**

CN Type: 10-pin header (1x10)

CN Location: See **Figure 3-8**

CN Pinouts: See **Table 3-9**

The front panel connector connects to external switches and indicators to monitor and controls the CPU card. These indicators and switches include:

- HDD LED
- Power button
- Power LED

- Reset

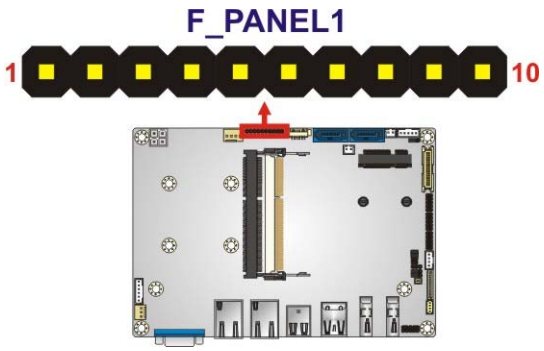


Figure 3-8: Front Panel Connector Location

FUNCTION	PIN	DESCRIPTION	FUNCTION	PIN	DESCRIPTION
	1	N/A	Power LED	6	PWR_LED+
Power Button	2	PWR_BTN+		7	PWR_LED+
	3	PWR_BTN-		8	PWR_LED-
HDD LED	4	HDD_LED+	Reset	9	RESET+
	5	HDD_LED-		10	RESET-

Table 3-9: Front Panel Connector Pinouts

3.2.8 LVDS Backlight Inverter Connector

CN Label: **INVERTER1**

CN Type: 5-pin wafer (1x5)

CN Location: See **Figure 3-9**

CN Pinouts: See **Table 3-10**

The backlight inverter connector provides power to an LCD panel.

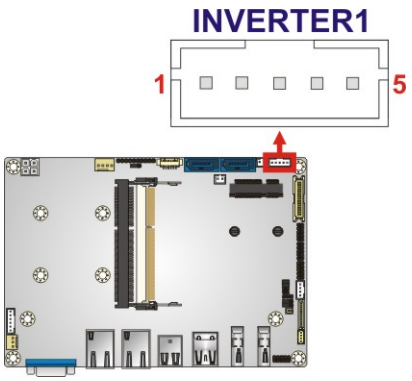


Figure 3-9: Backlight Inverter Connector Location

Pin	Description
1	BACKLIGHT ADJUST
2	GROUND
3	+12 V
4	GROUND
5	BACKLIGHT ENABLE

Table 3-10: Backlight Inverter Connector Pinouts

3.2.9 Keyboard/Mouse Connector

CN Label: **KB_MS1**

CN Type: 6-pin wafer (1x6)

CN Location: See **Figure 3-10**

CN Pinouts: See **Table 3-11**

The keyboard and mouse connector can be connected to a standard PS/2 cable or PS/2 Y-cable to add keyboard and mouse functionality to the system.

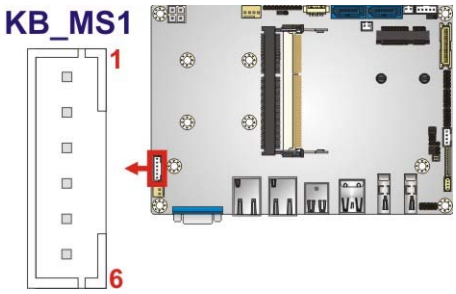


Figure 3-10: Keyboard/Mouse Connector Location

Pin	Description
1	VCC5_KBMS
2	MS DATA
3	MS CLK
4	KB DATA
5	KB CLK
6	GROUND

Table 3-11: Keyboard/Mouse Connector Pinouts

3.2.10 LVDS LCD Connector

CN Label: **LVDS1**

CN Type: 30-pin crimp (2x15)

CN Location: See **Figure 3-11**

CN Pinouts: See **Table 3-12**

The LVDS connector is for an LCD panel connected to the board.

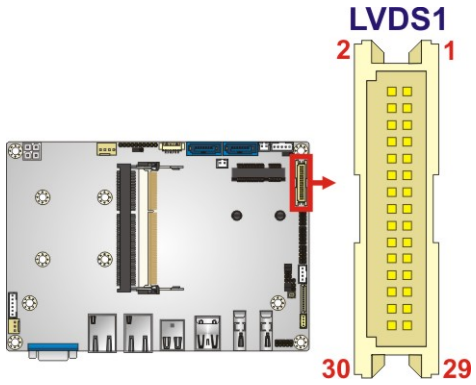


Figure 3-11: LVDS Connector Location

Pin	Description	Pin	Description
1	GND	2	GND
3	A_Y0	4	A_Y0#
5	A_Y1	6	A_Y1#
7	A_Y2	8	A_Y2#
9	A_CK	10	A_CK#
11	A_Y3	12	A_Y3#
13	GND	14	GND
15	B_Y0	16	B_Y0#
17	B_Y1	18	B_Y1#
19	B_Y2	20	B_Y2#
21	B_CK	22	B_CK#
23	B_Y3	24	B_Y3#
25	GND	26	GND
27	VCC/VCC3	28	VCC/VCC3
29	VCC/VCC3	30	VCC/VCC3

Table 3-12: LVDS Connector Pinouts

3.2.11 PCIe Mini Card Slot

CN Label: **CN3**

CN Type: PCIe Mini card slot

CN Location: See **Figure 3-12**

CN Pinouts: See **Table 3-13**

The PCIe Mini card slot enables a PCIe Mini card expansion module to be connected to the board. Cards supported include among others wireless LAN (WLAN) cards and mSATA cards.

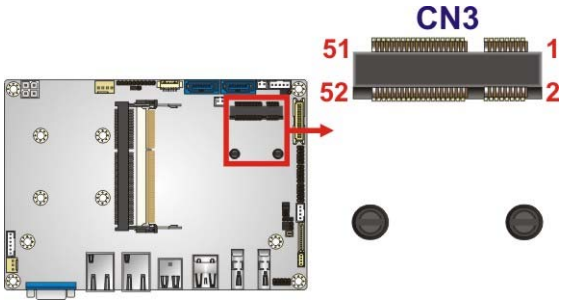


Figure 3-12: PCIe Mini Card Slot Location

Pin	Description	Pin	Description
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	1.5V
7	N/C	8	N/C
9	GND	10	N/C
11	CLK-	12	N/C
13	CLK+	14	N/C
15	GND	16	N/C
17	PCIRST#	18	GND
19	N/C	20	VCC3
21	GND	22	PCIRST#
23	PERN2	24	3VDual
25	PERP2	26	GND
27	GND	28	1.5V
29	GND	30	SMBCLK
31	PETN2	32	SMBDATA
33	PETP2	34	GND
35	GND	36	USBD-

Pin	Description	Pin	Description
37	N/C	38	USBD+
39	N/C	40	GND
41	N/C	42	N/C
43	N/C	44	N/C
45	N/C	46	N/C
47	N/C	48	1.5V
49	N/C	50	GND
51	N/C	52	VCC3

Table 3-13: PCIe Mini Card Slot Pinouts

3.2.12 Power Connector

CN Label: **PWR1**

CN Type: 4-pin connector (2x2)

CN Location: See **Figure 3-13**

CN Pinouts: See **Table 3-14**

This connector accepts 12 V of power for the processor.

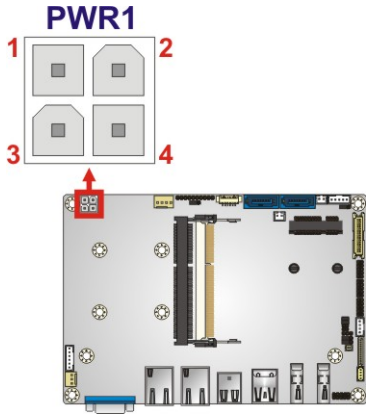


Figure 3-13: CPU Power Connector Location

Pin	Description	Pin	Description
1	GND	2	GND
3	+12 V	4	+12 V

Table 3-14: CPU Power Connector Pinouts

3.2.13 SATA 6Gb/s Connector

CN Label: **S_ATA1, S_ATA2**

CN Type: 7-pin SATA drive connector

CN Location: See **Figure 3-14**

CN Pinouts: See **Table 3-15**

The SATA connectors connect to SATA hard drives or optical drives with data transfer speeds as high as 6Gb/s.

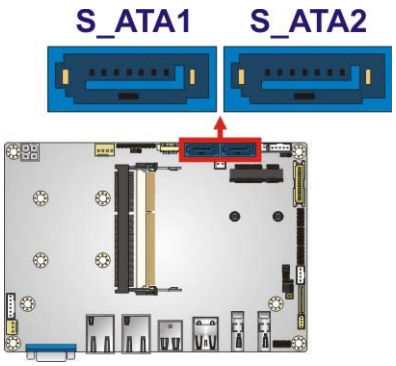


Figure 3-14: SATA Drive Connector Locations

Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

Table 3-15: SATA Drive Connector Pinouts

3.2.14 SATA Power Connectors

CN Label: **CN1, CN2**

CN Type: 2-pin wafer

CN Location: See **Figure 3-15**

CN Pinouts: See **Table 3-16**

Use the SATA Power Connector to connect to SATA device power connections. Total +5V SATA power is 2A (CN1+CN2).

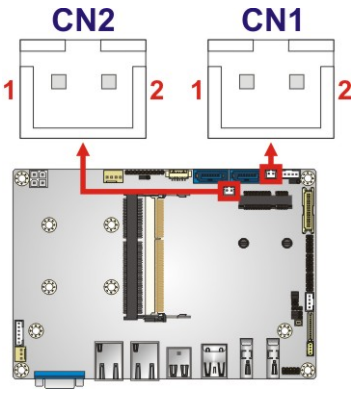


Figure 3-15: SATA Power Connector Locations

Pin	Description
1	+V5S
2	GND

Table 3-16: SATA Power Connector Pinouts

3.2.15 Serial Port Connectors (COM 1 and COM 2)

CN Label: **COM1, COM2**

CN Type: 10-pin header (2x5)

CN Location: See **Figure 3-16**

CN Pinouts: See **Table 3-17**

The 10-pin serial port connectors provide three RS-232 serial communications channels. The COM serial port connectors can be connected to external RS-232 serial port devices.

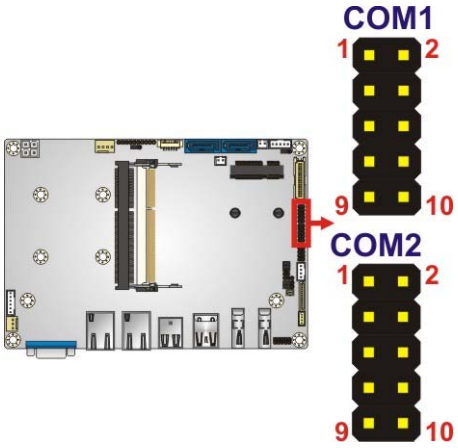


Figure 3-16: COM Connector Locations

Pin	Description	Pin	Description
1	-NDCD	6	-NCTS
2	-NDSR	7	-NDTR
3	NSIN	8	-XRI
4	-NRTS	9	GND
5	NSOUT	10	GND

Table 3-17: COM Connector Pinouts

3.2.16 Serial Port Connector (COM3)

CN Label: **COM3**

CN Type: 4-pin wafer (1x4)

CN Location: See **Figure 3-17**

CN Pinouts: See **Table 3-18**

NOTE:

These pins are shared with those on the main serial port. Use either the pins on the main connector, or on this connector, but not both.

This connector provides RS-422 or RS-485 communications.

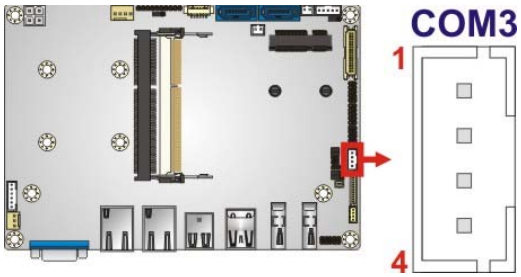


Figure 3-17: Serial Port Connector Location

Pin	Description
1	RXD422-
2	RXD422+
3	TXD422+/TXD485+
4	TXD422-/TXD485-

Table 3-18: Serial Port Connector Pinouts

Use the optional RS-422/485 cable to connect to a serial device. The pinouts of the DB-9 connector are listed below.

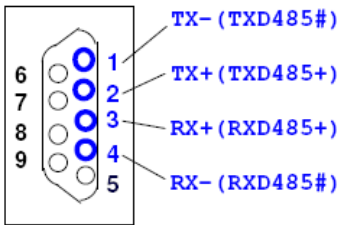
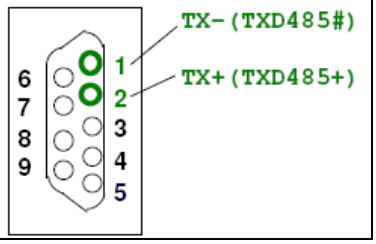
RS-422 Pinouts	RS-485 Pinouts
	

Table 3-19: DB-9 RS-422/485 Pinouts

3.2.17 SMBus Connector

CN Label: **CN4**

CN Type: 4-pin wafer (1x4)

CN Location: See **Figure 3-18**

CN Pinouts: See **Table 3-20**

The SMBus Connector provides a connection to a SMBus (System Management Bus) device.

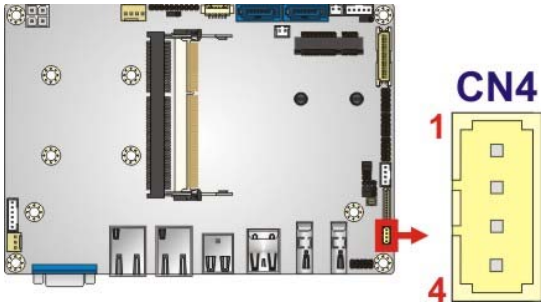


Figure 3-18: SMBus Connector Location

Pin	Description
1	GND
2	SMB_DATA
3	SMB_CLK
4	+V5S

Table 3-20: SMBus Connector Pinouts

3.2.18 SPI Flash Connector

CN Label: **JSPI1**

CN Type: 8-pin wafer (2x4)

CN Location: See **Figure 3-19**

CN Pinouts: See **Table 3-21**

The SPI Flash connector is used to flash the BIOS.

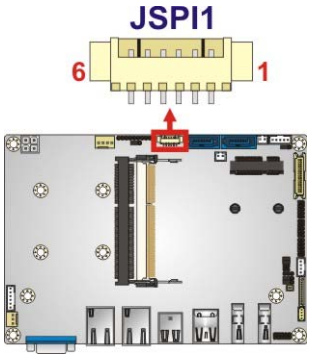


Figure 3-19: SPI Flash Connector Location

Pin	Description	Pin	Description
1	+V3.3M_SPI_CON	5	SPI_SI_SW
2	SPI_CS	6	GND
3	SPI_SO_SW	7	GND
4	SPI_CLK_SW	8	GND

Table 3-21: SPI Flash Connector

3.3 External Peripheral Interface Connector Panel

Figure 3-20 shows the NANO-HM651 external peripheral interface connector (EPIC) panel. The NANO-HM651 EPIC panel consists of the following:

- 2 x RJ-45 LAN connectors
- 2 x HDMI connectors
- 2 x USB 2.0 connectors
- 2 x USB 3.0 connectors
- 1 x VGA connector

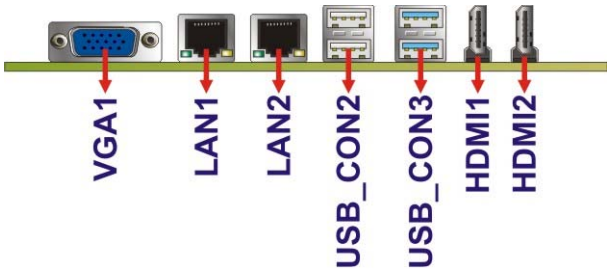


Figure 3-20: NANO-HM651 External Peripheral Interface Connector

3.3.1 Ethernet Connectors

CN Label: **LAN1 and LAN2**

CN Type: RJ-45

CN Location: See **Figure 3-20**

CN Pinouts: See **Table 3-22**

The NANO-HM651 is equipped with two built-in RJ-45 Ethernet controllers. The controllers can connect to the LAN through two RJ-45 LAN connectors. There are two LEDs on the connector indicating the status of LAN. The pin assignments are listed in the following table:

Pin	Description	Pin	Description
1	LAN1_MDI0+	7	LAN1_MDI2+
2	LAN1_MDI0-	8	LAN1_MDI2-
3.	LAN1_MDI1+	9	LAN1_MDI3+
4.	LAN1_MDI1-	10	LAN1_MDI3-

Table 3-22: LAN Pinouts

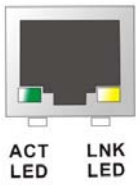


Figure 3-21: RJ-45 Ethernet Connector

The RJ-45 Ethernet connector has two status LEDs, one yellow (activity/link) and one green/orange (speed). The yellow LED indicates activity/link on the port and the green/orange LED indicates the connection speed. See **Table 3-23**.

ACT/LINK LED		SPEED LED	
STATUS	**DESCRIPTION**	**STATUS**	**DESCRIPTION**
OFF	No Link	OFF	10 Mbps connection
YELLOW	Link	GREEN	100 Mbps connection
BLINKING	Data activity	ORANGE	1000 Mbps connection

Table 3-23: RJ-45 Ethernet Connector LEDs

3.3.2 HDMI Connectors

CN Label: **HDMI1, HDMI2**

CN Type: HDMI connector

CN Location: See **Figure 3-20**

CN Pinouts: See **Table 3-24** and **Figure 3-22**

The HDMI connector connects to a display device with HDMI interface.

Pin	Description	Pin	Description
1	HDMI_DATA2	13	N/C
2	GND	14	N/C
3	HDMI_DATA2#	15	HDMI_SCL
4	HDMI_DATA1	16	HDMI_SDA
5	GND	17	GND
6	HDMI_DATA1#	18	+5V
7	HDMI_DATA0	19	HDMI_HPD
8	GND	20	HDMI_GND
9	HDMI_DATA0#	21	HDMI_GND
10	HDMI_CLK	22	HDMI_GND
11	GND	23	HDMI_GND
12	HDMI_CLK#		

Table 3-24: HDMI Connector Pinouts

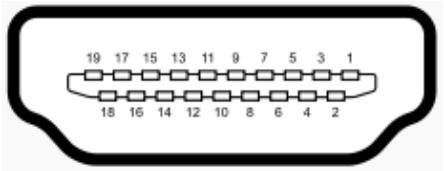


Figure 3-22: HDMI Connector

3.3.3 USB 2.0 Connectors

CN Label: **USB_CON2**

CN Type: USB 2.0 port

CN Location: See **Figure 3-20**

CN Pinouts: See **Table 3-25**

The NANO-HM651 has two external USB 2.0 ports. The ports connect to both USB 2.0 and USB 1.1 devices.

Pin	Description
1	VCC
2	DATA-
3	DATA+
4	GND

Table 3-25: USB 2.0 Port Pinouts

3.3.4 USB 3.0 Connectors

CN Label: **USB_CON3**

CN Type: USB 3.0 port

CN Location: See **Figure 3-20**

CN Pinouts: See **Table 3-26**

The USB 3.0 connector can be connected to a USB device.

Pin	Description
1	VBUS
2	D1-
3	D1+
4	GND1
5	STDA_SSRX1_N
6	STDA_SSRX1_P
7	GND_DRAIN
8	STDA_SSTX1_N
9	STDA_SSTX1_P

Table 3-26: USB 3.0 Port Pinouts

3.3.5 VGA Connector

CN Label: **VGA1**

CN Type: 15-pin Female

CN Location: See **Figure 3-20**

CN Pinouts: See **Figure 3-23** and **Table 3-27**

The NANO-HM651 has a single 15-pin female connector for connectivity to standard display devices.

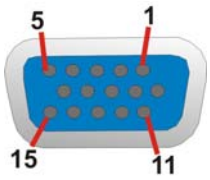


Figure 3-23: VGA Connector

Pin	Description	Pin	Description
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	VCC
7	GND	8	GND
9	VCC	10	GND
11	NC	12	DDC DAT
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 3-27: VGA Connector Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the NANO-HM651 may result in permanent damage to the NANO-HM651 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the NANO-HM651. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the NANO-HM651 or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***: Before handling the board, touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: When configuring the NANO-HM651, place it on an antic-static pad. This reduces the possibility of ESD damaging the NANO-HM651.
- ***Only handle the edges of the PCB***: When handling the PCB, hold the PCB by the edges.

4.2 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before the NANO-HM651 is installed. All installation notices pertaining to the installation of the NANO-HM651 should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the NANO-HM651 and injury to the person installing the CPU card.

WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the NANO-HM651, NANO-HM651 components and injury to the user.

Before and during the installation please **DO** the following:

- **Read the user manual**:
  - The user manual provides a complete description of the NANO-HM651 installation instructions and configuration options.
- **Wear an electrostatic discharge cuff (ESD)**:
  - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- **Place the NANO-HM651 on an antistatic pad**:
  - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- **Turn all power to the NANO-HM651 off**:
  - When working with the NANO-HM651, make sure that it is disconnected from all power supplies and that no electricity is being fed into the system.

Before and during the installation of the NANO-HM651 **DO NOT:**

- Remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- Use the product before verifying all the cables and power connectors are properly connected.
- Allow screws to come in contact with the PCB circuit, connector pins, or its components.

4.3 SO-DIMM Installation

WARNING:

Using incorrectly specified SO-DIMM may cause permanently damage the NANO-HM651. Please make sure the purchased SO-DIMM complies with the memory specifications of the NANO-HM651. SO-DIMM specifications compliant with the NANO-HM651 are listed in the specification table of Chapter 1.

To install an SO-DIMM, please follow the steps below and refer to Figure 4-1.

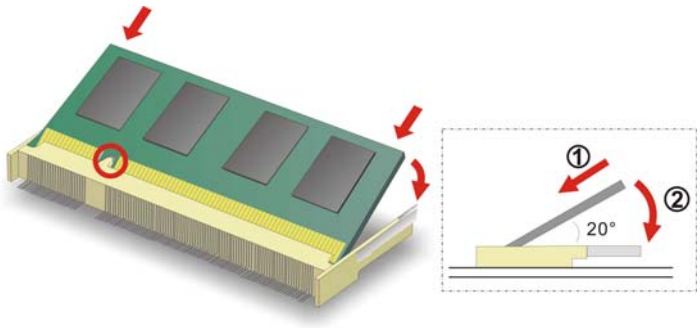


Figure 4-1: SO-DIMM Installation

Step 1: **Locate the SO-DIMM socket**. Place the board on an anti-static mat.

Step 2: **Align the SO-DIMM with the socket**. Align the notch on the memory with the notch on the memory socket.

Step 3: **Insert the SO-DIMM**. Push the memory in at a 20º angle. (See Figure 4-1)

Step 4: **Seat the SO-DIMM**. Gently push downwards and the arms clip into place. (See Figure 4-1)

4.4 PCIe Mini Card Installation

To install the PCIe Mini card, please refer to the diagram and instructions below.

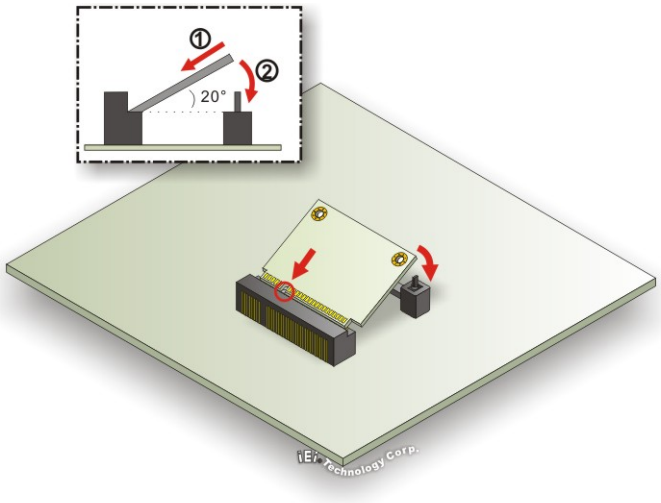


Figure 4-2: PCIe Mini Card Installation

Step 1: **Insert into the socket at an angle**. Line up the notch on the card with the notch on the connector. Slide the PCIe Mini card into the socket at an angle of about 20º.

Step 2: **Push down until the card clips into place**. Push the other end of the card down until it clips into place on the plastic connector.

4.5 Heat Sink Enclosure

WARNING:

Never run the NANO-HM651 without the heat sink secured to the board. The heat sink ensures the system remains cool and does not need addition heat sinks to cool the system.

WARNING:

When running the NANO-HM651, do not put the NANO-HM651 directly on a surface that can not dissipate system heat, especially the wooden or plastic desk. It is highly recommended to run the NANO-HM651

→ on a heat dissipation surface or

→ using copper pillars to hold the board up from the desk below

When the NANO-HM651 is shipped it is secured to a heat sink with eight retention screws. If the NANO-HM651 must be removed from the heat sink, the eight retention screws must be removed.

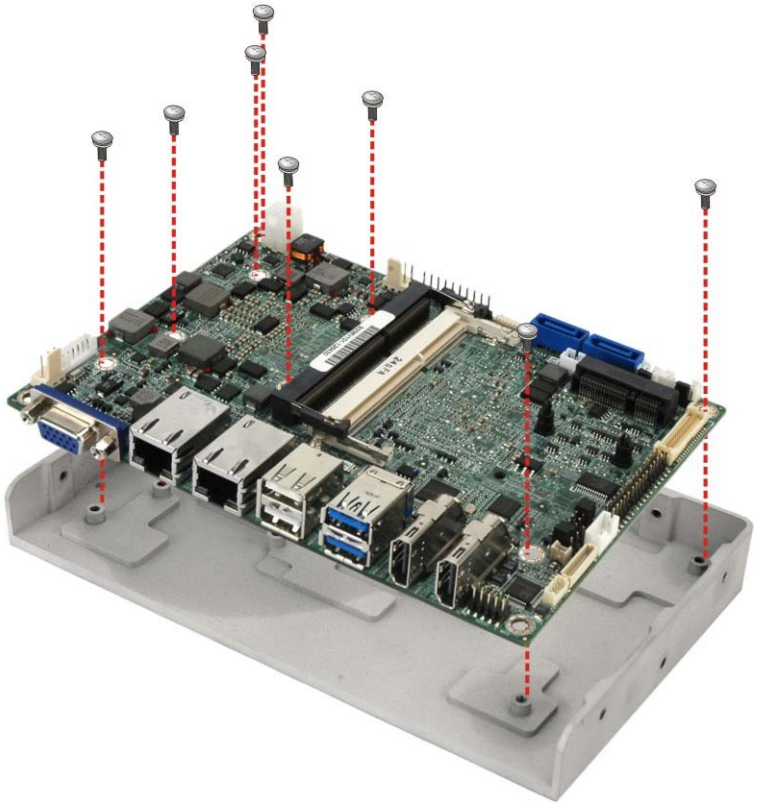
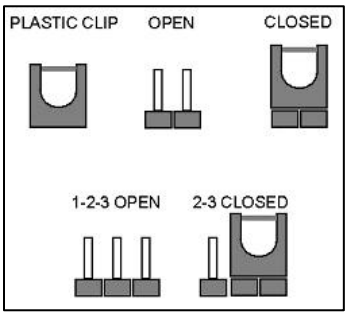


Figure 4-3: Heat Sink Retention Screws

4.6 Jumper Settings

NOTE:

A jumper is a metal bridge used to close an electrical circuit. It consists of two or three metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To CLOSE/SHORT a jumper means connecting the pins of the jumper with the plastic clip and to OPEN a jumper means removing the plastic clip from a jumper.



Before the NANO-HM651 is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the NANO-HM651 are listed in **Table 4-1**.

Description	Label	Type
AT/ATX power mode select	J_ATXCTL1	3-pin header
Clear CMOS	J_CMOS1	3-pin header
LVDS voltage select	J_VLVDS1	3-pin header
LVDS panel resolution select	J_PID1	8-pin header
TPM setting	ME_RTC1	3-pin header
Flash descriptor security override	J_FLASH1	3-pin header

Table 4-1: Jumpers

4.6.1 AT/ATX Power Mode Select Jumper

Jumper Label: **J_ATXCTL1**

Jumper Type: 3-pin header

Jumper Settings: See **Table 4-2**

Jumper Location: See **Figure 4-4**

The AT/ATX Power Select jumper specifies the systems power mode as AT or ATX.

Setting	Description
Short 1-2	Use ATX power (Default)
Short 2-3	Use AT power

Table 4-2: AT/ATX Power Mode Jumper Settings

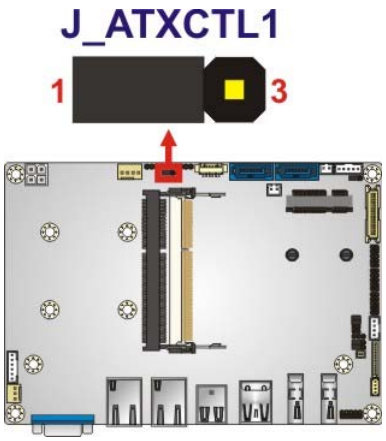


Figure 4-4: AT/ATX Power Mode Jumper Location

4.6.2 Clear CMOS Jumper

Jumper Label: **J_CMOS1**

Jumper Type: 3-pin header

Jumper Settings: See **Table 4-3**

Jumper Location: See **Figure 4-5**

If the NANO-HM651 fails to boot due to improper BIOS settings, the clear CMOS jumper clears the CMOS data and resets the system BIOS information. To do this, use the jumper cap to close pins 2 and 3 for a few seconds then reinstall the jumper clip back to pins 1 and 2.

If the “CMOS Settings Wrong” message is displayed during the boot up process, the fault may be corrected by pressing the F1 to enter the CMOS Setup menu. Do one of the following:

- Enter the correct CMOS setting
- Load Optimal Defaults

- Load Failsafe Defaults.

After having done one of the above, save the changes and exit the CMOS Setup menu.

The clear CMOS jumper settings are shown in **Table 4-3**.

Setting	Description
Short 1 - 2	Keep CMOS Setup (Default)
Short 2 - 3	Clear CMOS Setup

Table 4-3: Clear CMOS Jumper Settings

The location of the clear CMOS jumper is shown in **Figure 4-5** below.

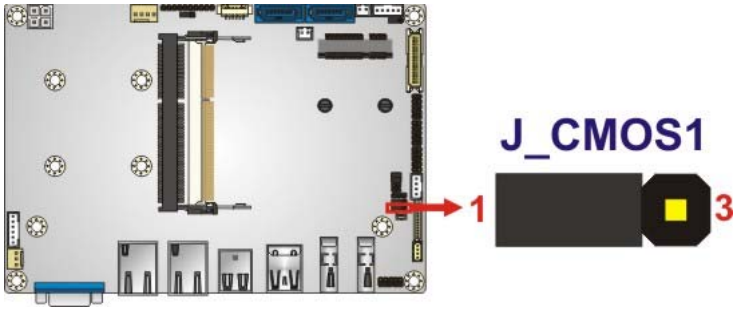


Figure 4-5: Clear CMOS Jumper

4.6.3 LVDS Voltage Selection Jumper

WARNING:

Incorrect voltages can destroy the LCD panel. Make sure to select a voltage that matches the voltage required by the LCD panel.

Jumper Label:	**J_VLVDS1**
Jumper Type:	3-pin header
Jumper Settings:	See **Table 4-4**
Jumper Location:	See **Figure 4-6**

The LCD voltage selection jumper sets the voltage of the power supplied to the LCD panel.

Setting	Description
Short 1-2	+3.3 V (Default)
Short 2-3	+5.0 V

Table 4-4: LVDS Voltage Selection Jumper Settings

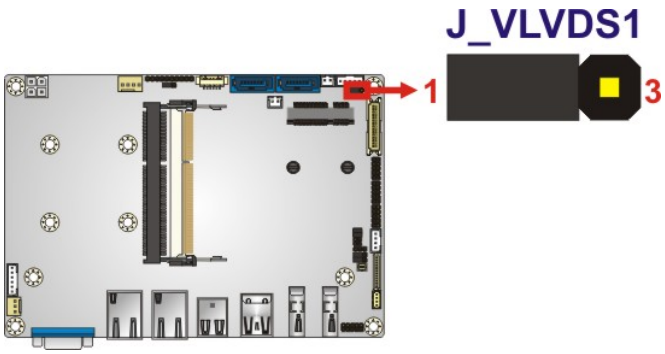


Figure 4-6: LVDS Voltage Selection Jumper Location

4.6.4 LVDS Panel Resolution Selection Jumper

Jumper Label: **J_PID1**

Jumper Type: 8-pin header

Jumper Settings: See **Table 4-5**

Jumper Location: See **Figure 4-7**

The **LVDS Panel Resolution Selection** jumper allows the LVDS screen voltage to be set. The **LVDS Panel Resolution Selection** jumper settings are shown in **Table 4-5**.

Pin	Description
Open	640 X 480 (18bit)
1-2	800 X 480 (18bit)
3-4	800 X 600 (18bit)
1-2 and 3-4	1024 X 768 (18bit)
5-6	1024 X 768 (24bit)
1-2 and 5-6	1280 X 1024 (48bit)

Pin	Description
3-4 and 5-6	1600 X 1200 (48bit)
1-2 and 3-4 and 5-6	1280 X 768 (18bit)
7-8	1280 X 800 (18bit)
1-2 and 7-8	1366 X 768 (24bit)
3-4 and 7-8	1440 X 900 (48bit)
1-2 and 3-4 and 7-8	1600 X 900 (48bit)
5-6 and 7-8	1680 X 1050 (48bit)
1-2 and 5-6 and 7-8	1920 X 1080 (48bit)
3-4 and 5-6 and 7-8	1920 X 1200 (48bit)
Short all	LVDS Disabled

Table 4-5: LVDS Screen Resolution Jumper Settings

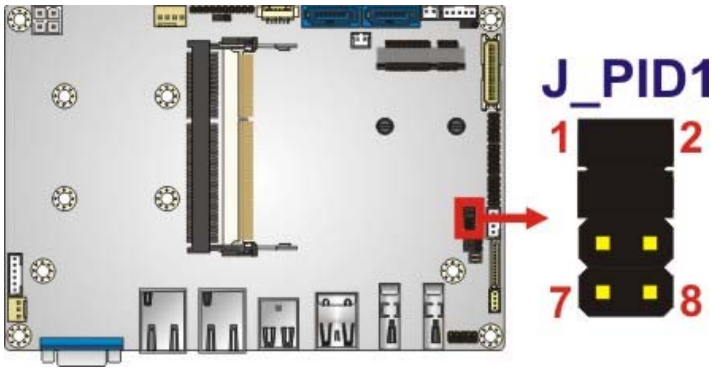


Figure 4-7: LVDS Screen Resolution Jumper Locations

4.6.5 TPM Setting Jumper

Jumper Label: **ME_RTC1**

Jumper Type: 3-pin header

Jumper Settings: See **Table 4-6**

Jumper Location: See **Figure 4-8**

The TPM Setting jumper configures the TPM setting.

Setting	Description
Short 1-2	Save ME RTC registers (Default)

Setting	Description
Short 2-3	Clear ME RTC registers

Table 4-6: TPM Setting Jumper Settings

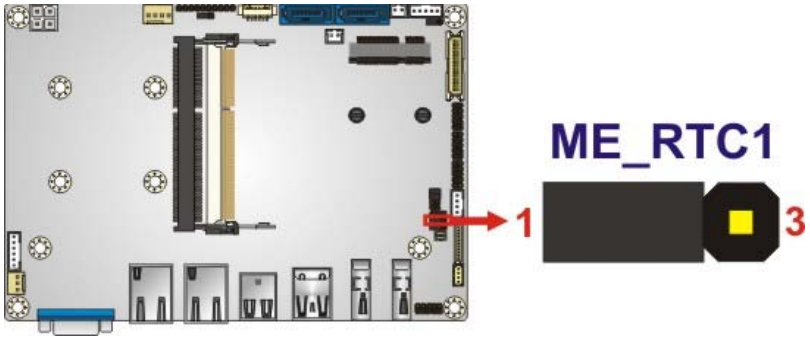


Figure 4-8: TPM Setting Jumper Location

4.6.6 Flash Descriptor Security Override Jumper

Jumper Label: **J_FLASH1**

Jumper Type: 3-pin header

Jumper Settings: See **Table 4-7**

Jumper Location: See **Figure 4-9**

The Flash Descriptor Security Override jumper specifies whether to override the flash descriptor.

Setting	Description
Short 1-2	Disabled (No override)
Short 2-3	Enabled (Override)

Table 4-7: Flash Descriptor Security Override Jumper Settings

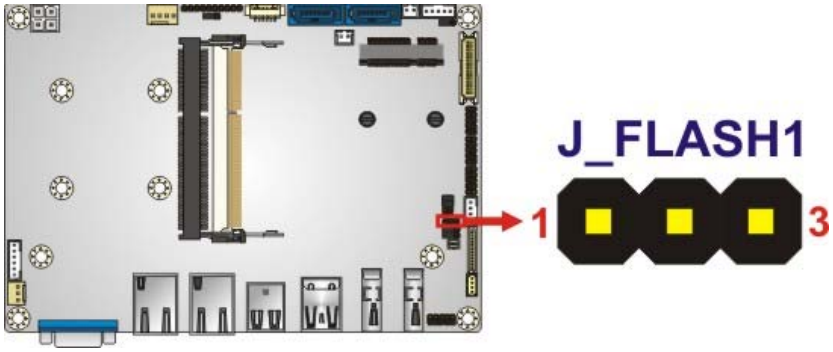


Figure 4-9: Flash Descriptor Security Override Jumper Location

4.7 Chassis Installation

4.7.1 Airflow

WARNING:

Airflow is critical to the cooling of the CPU and other onboard components. The chassis in which the NANO-HM651 must have air vents to allow cool air to move into the system and hot air to move out.

The NANO-HM651 must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.

4.7.2 Motherboard Installation

To install the NANO-HM651 motherboard into the chassis please refer to the reference material that came with the chassis.

4.8 Internal Peripheral Device Connections

This section outlines the installation of peripheral devices to the onboard connectors.

4.8.1 AT Power Connection

Follow the instructions below to connect the NANO-HM651 to an AT power supply.

WARNING:

Disconnect the power supply power cord from its AC power source to prevent a sudden power surge to the NANO-HM651.

Step 1: **Locate the power cable**. The power cable is shown in the packing list in **Chapter 3**.

Step 2: **Connect the Power Cable to the Motherboard**. Connect the 4-pin (2x2) Molex type power cable connector to the AT power connector on the motherboard. See Figure 4-10.

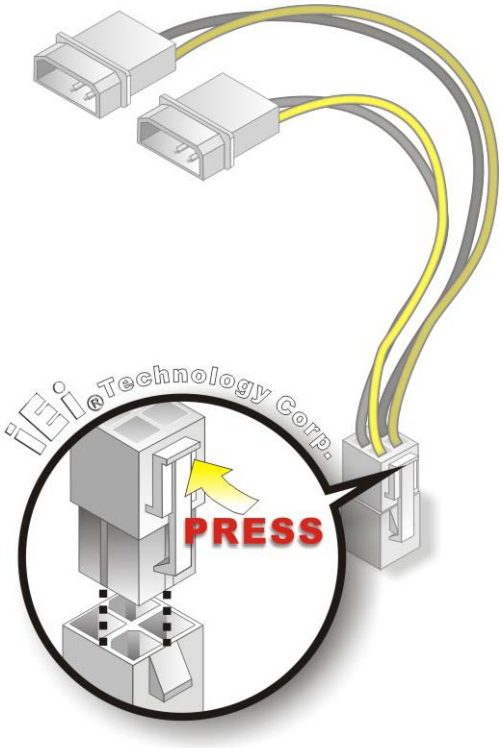


Figure 4-10: Power Cable to Motherboard Connection

Step 3: **Connect Power Cable to Power Supply**. Connect one of the 4-pin (1x4) Molex type power cable connectors to an AT power supply. See Figure 4-11.

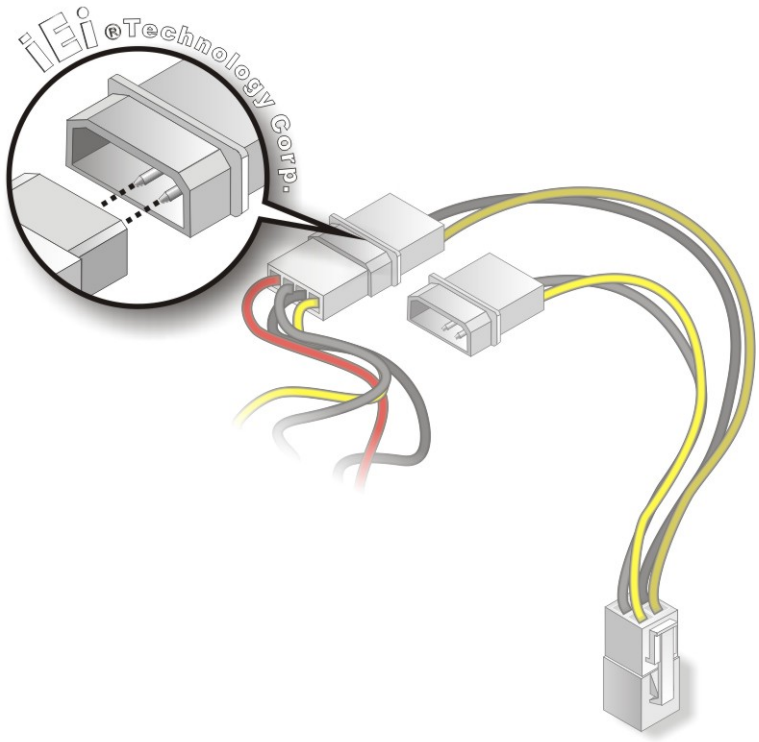


Figure 4-11: Connect Power Cable to Power Supply

4.8.2 Audio Kit Installation

The Audio Kit that came with the NANO-HM651 connects to the audio connector on the NANO-HM651. The audio kit consists of three audio jacks. Mic-in connects to a microphone. Line-in provides a stereo line-level input to connect to the output of an audio device. Line-out, a stereo line-level output, connects to two amplified speakers. To install the audio kit, please refer to the steps below:

Step 1: **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

Step 2: **Align pin 1**. Align pin 1 on the on-board connector with pin 1 on the audio kit connector. Pin 1 on the audio kit connector is indicated with a white dot. See Figure 4-12.

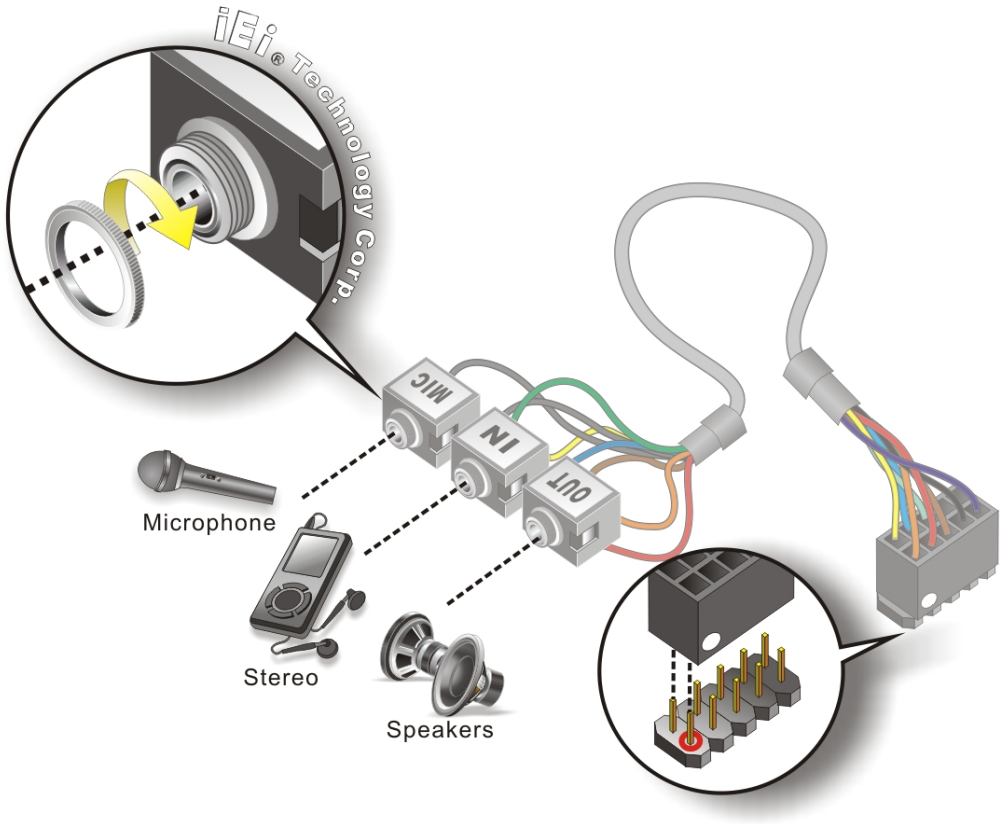


Figure 4-12: Audio Kit Cable Connection

Step 3: **Connect the audio devices**. Connect speakers to the line-out audio jack. Connect the output of an audio device to the line-in audio jack. Connect a microphone to the mic-in audio jack.

4.8.3 SATA Drive Connection

The NANO-HM651 is shipped with a SATA drive cable. To connect the SATA drive to the connector, please follow the steps below.

Step 1: **Locate the SATA connector and the SATA power connector**. The locations of the connectors are shown in **Chapter 3**.

Step 2: **Insert the cable connector**. Insert the cable connector into the on-board SATA drive connector and the SATA power connector. See **Figure 4-13**.

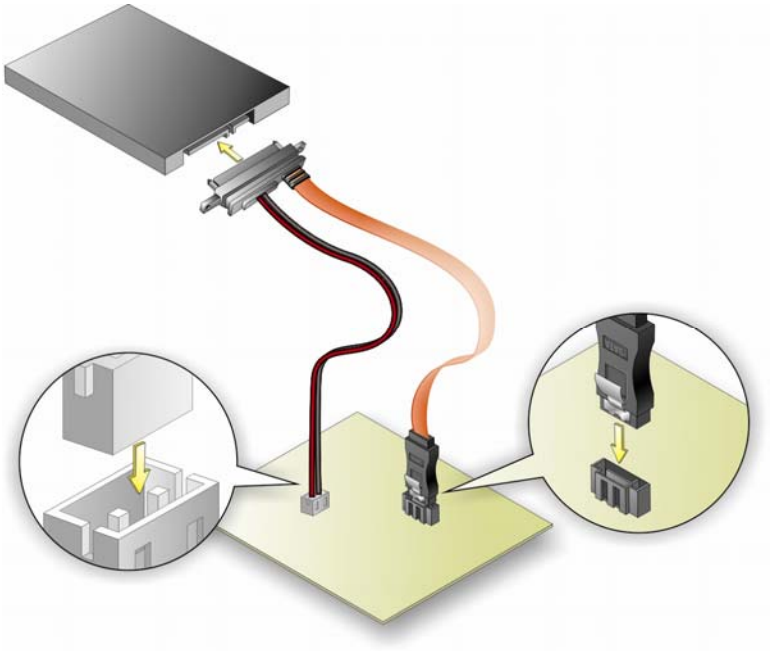


Figure 4-13: SATA Drive Cable Connection

Step 3: **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 4-13**.

Step 4: To remove the SATA cable from the SATA connector, press the clip on the connector at the end of the cable.

4.8.4 Single RS-232 Cable

The single RS-232 cable consists of one serial port connector attached to a serial communications cable that is then attached to a D-sub 9 male connector. To install the single RS-232 cable, please follow the steps below.

Step 1: **Locate the connector**. The location of the RS-232 connector is shown in **Chapter 3**.

Step 2: **Insert the cable connector**. Insert the connector into the serial port box header. See Figure 4-14. A key on the front of the cable connectors ensures the connector can only be installed in one direction.

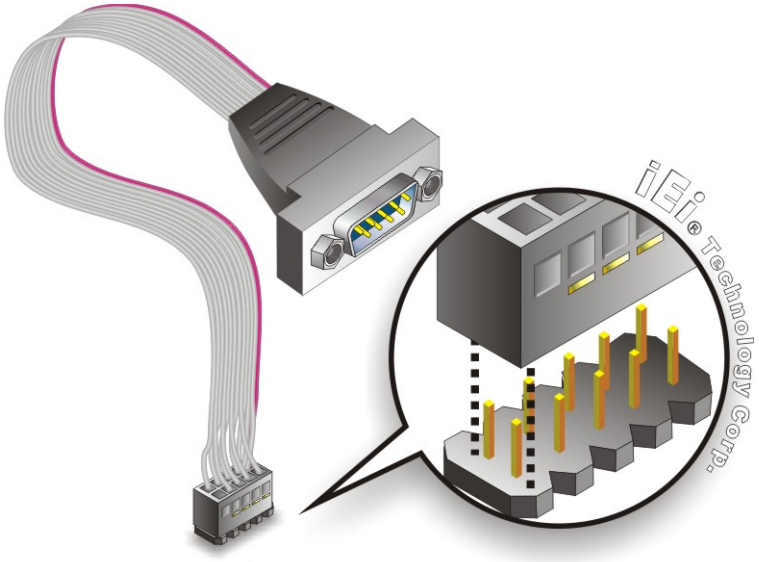


Figure 4-14: Single RS-232 Cable Installation

Step 3: **Secure the bracket**. The single RS-232 connector has two retention screws that must be secured to a chassis or bracket.

Step 4: **Connect the serial device**. Once the single RS-232 connector is connected to a chassis or bracket, a serial communications device can be connected to the system.

4.8.5 USB Cable (Optional)

The NANO-HM651 is shipped with a dual port USB 2.0 cable. To connect the USB cable connector, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the USB connectors are shown in **Chapter 3**.

WARNING:

If the USB pins are not properly aligned, the USB device can burn out.

Step 2: **Align the connectors**. The cable has two connectors. Correctly align pin 1on each cable connector with pin 1 on the NANO-HM651 USB connector.

Step 3: **Insert the cable connectors**. Once the cable connectors are properly aligned with the USB connectors on the NANO-HM651, connect the cable connectors to the on-board connectors. See Figure 4-15.

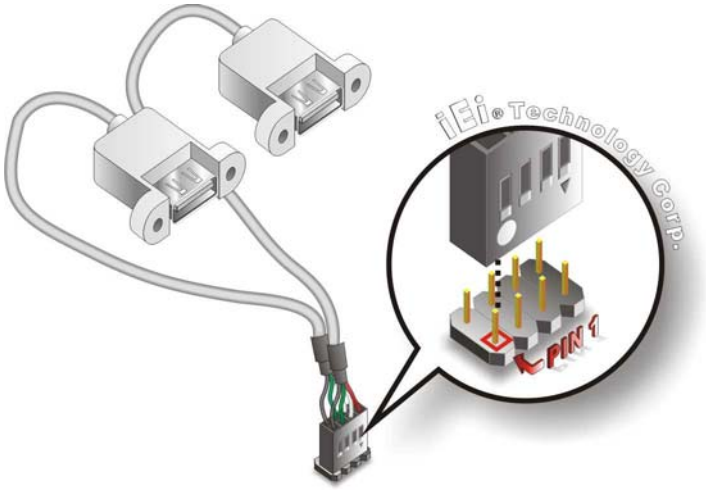


Figure 4-15: Dual USB Cable Connection

Step 4: **Attach the USB connectors to the chassis**. The USB 2.0 connectors each of two retention screw holes. To secure the connectors to the chassis please refer to the installation instructions that came with the chassis.

4.9 External Peripheral Interface Connection

The following external peripheral devices can be connected to the external peripheral interface connectors.

- RJ-45 Ethernet cable connectors
- USB devices
- VGA monitors
- HDMI displays

To install these devices, connect the corresponding cable connector from the actual device to the corresponding NANO-HM651 external peripheral interface connector making sure the pins are properly aligned.

4.9.1 HDMI Display Device Connection

The HDMI connector transmits a digital signal to compatible HDMI display devices such as a TV or computer screen. To connect the HDMI cable to the NANO-HM651, follow the steps below.

Step 1: **Locate the HDMI connector**. The location is shown in **Chapter 3**.

Step 2: **Align the connector.** Align the HDMI connector with the HDMI port. Make sure the orientation of the connector is correct.

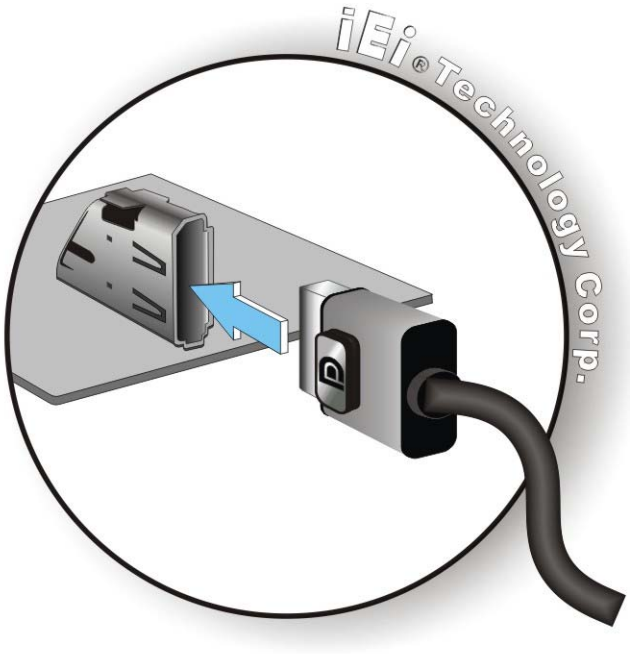


Figure 4-16: HDMI Connection

Step 3: **Insert the HDMI connector.** Gently insert the HDMI connector. The connector should engage with a gentle push. If the connector does not insert easily, check again that the connector is aligned correctly, and that the connector is being inserted in the right way.

4.9.2 LAN Connection

There are two external RJ-45 LAN connectors. The RJ-45 connectors enable connection to an external network. To connect a LAN cable with an RJ-45 connector, please follow the instructions below.

Step 1: **Locate the RJ-45 connectors**. The locations of the USB connectors are shown in **Chapter 3**.

Step 2: **Align the connectors.** Align the RJ-45 connector on the LAN cable with one of the RJ-45 connectors on the NANO-HM651. See **Figure 4-17**.

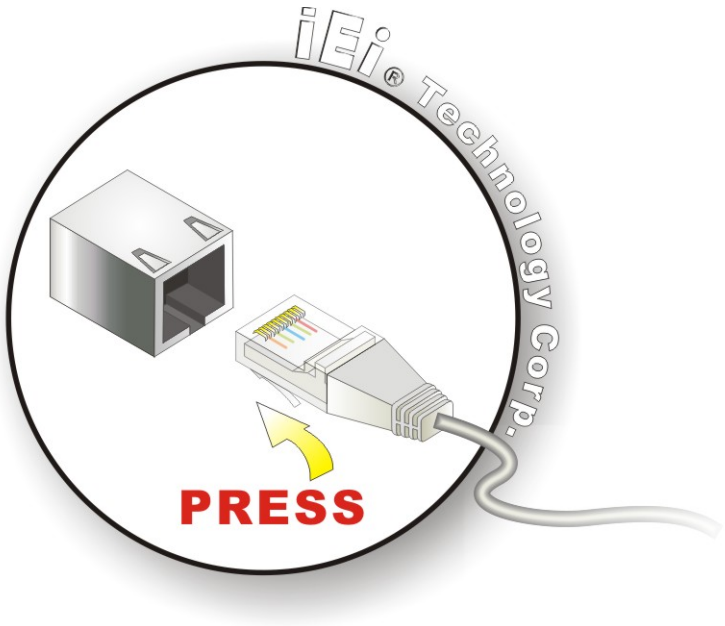


Figure 4-17: LAN Connection

Step 3: **Insert the LAN cable RJ-45 connector.** Once aligned, gently insert the LAN cable RJ-45 connector into the onboard RJ-45 connector.

4.9.3 USB Connection

The external USB Series "A" receptacle connector provides easier and quicker access to external USB devices. Follow the steps below to connect USB devices to the NANO-HM651.

Step 1: **Locate the USB Series "A" receptacle connectors**. The location of the USB

Series "A" receptacle connectors are shown in **Chapter 3**.

Step 2: **Insert a USB Series "A" plug**. Insert the USB Series "A" plug of a device into the USB Series "A" receptacle on the external peripheral interface. See **Figure 4-18**.

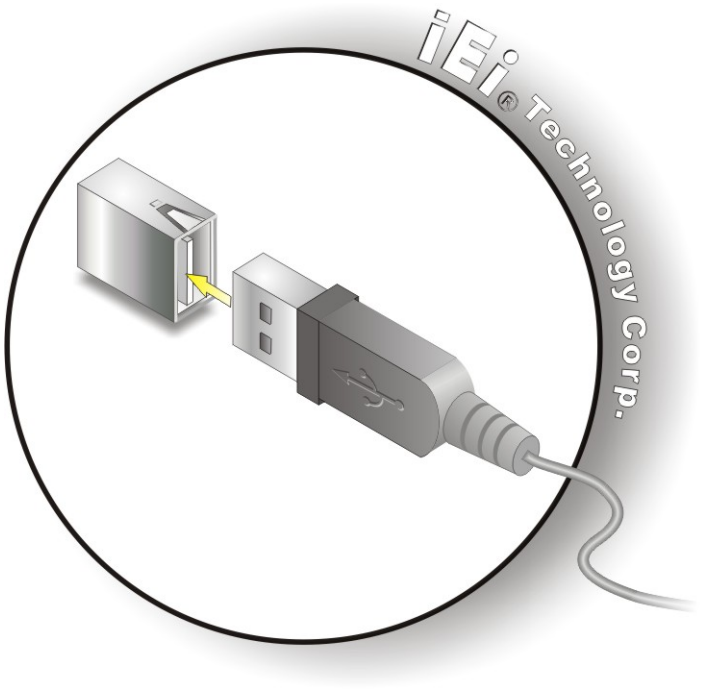


Figure 4-18: USB Connector

4.9.4 VGA Monitor Connection

The NANO-HM651 has a single female DB-15 connector on the external peripheral interface panel. The DB-15 connector is connected to a CRT or VGA monitor. To connect a monitor to the NANO-HM651, please follow the instructions below.

Step 1: **Locate the female DB-15 connector**. The location of the female DB-15 connector is shown in **Chapter 3**.

Step 2: **Align the VGA connector**. Align the male DB-15 connector on the VGA screen cable with the female DB-15 connector on the external peripheral interface.

Step 3: **Insert the VGA connector**. Once the connectors are properly aligned with the

insert the male connector from the VGA screen into the female connector on the NANO-HM651. See **Figure 4-19**.

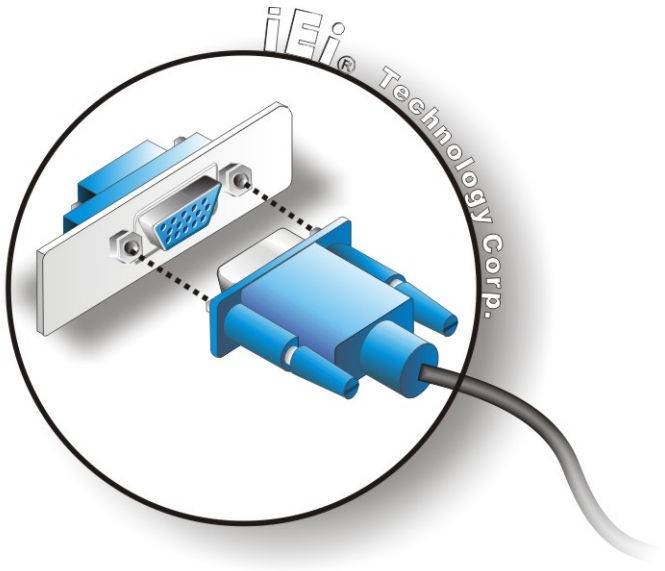


Figure 4-19: VGA Connector

Step 4: **Secure the connector**. Secure the DB-15 VGA connector from the VGA monitor to the external interface by tightening the two retention screws on either side of the connector.

4.10 Software Installation

All the drivers for the NANO-HM651 are on the CD that came with the system. To install the drivers, please follow the steps below.

Step 1: Insert the CD into a CD drive connected to the system.

NOTE:

If the installation program doesn't start automatically:
Click "Start->My Computer->CD Drive->autorun.exe"

Step 2: The driver main menu appears (**Figure 4-20**).

Figure 4-20: Introduction Screen

Step 3: Click **NANO-HM651**.

Step 4: A new screen with a list of available drivers appears (**Figure 4-21**).

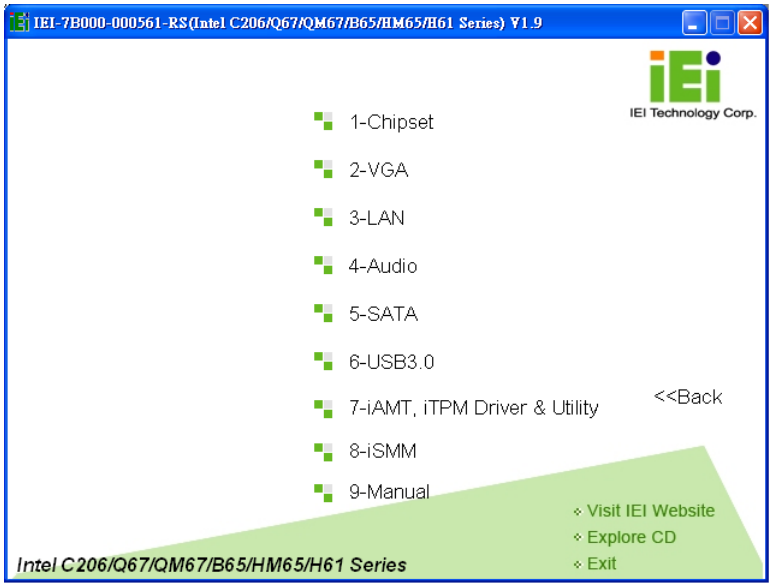


Figure 4-21: Available Drivers

Step 5: Install all of the necessary drivers in this menu.

Chapter

5

BIOS Screens

5.1 Introduction

The BIOS is programmed onto the BIOS chip. The BIOS setup program allows changes to certain system settings. This chapter outlines the options that can be changed.

5.1.1 Starting Setup

The AMI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the **DELETE** or **F2** key as soon as the system is turned on or
2. Press the **DELETE** or **F2** key when the "**Press Del to enter SETUP**" message appears on the screen.

If the message disappears before the **DELETE** or **F2** key is pressed, restart the computer and try again.

5.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **ESC** to quit. Navigation keys are shown in.

Key	Function
Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 key	Load previous values.
F3 key	Load optimized defaults

Key	Function
F4 key	Save all the CMOS changes
Esc key	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu

Table 5-1: BIOS Navigation Keys

5.1.3 Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

5.1.4 Unable to Reboot After Configuration Changes

If the computer cannot boot after changes to the system configuration is made, CMOS defaults. Use the jumper described in Chapter **4**.

5.1.5 BIOS Menu Bar

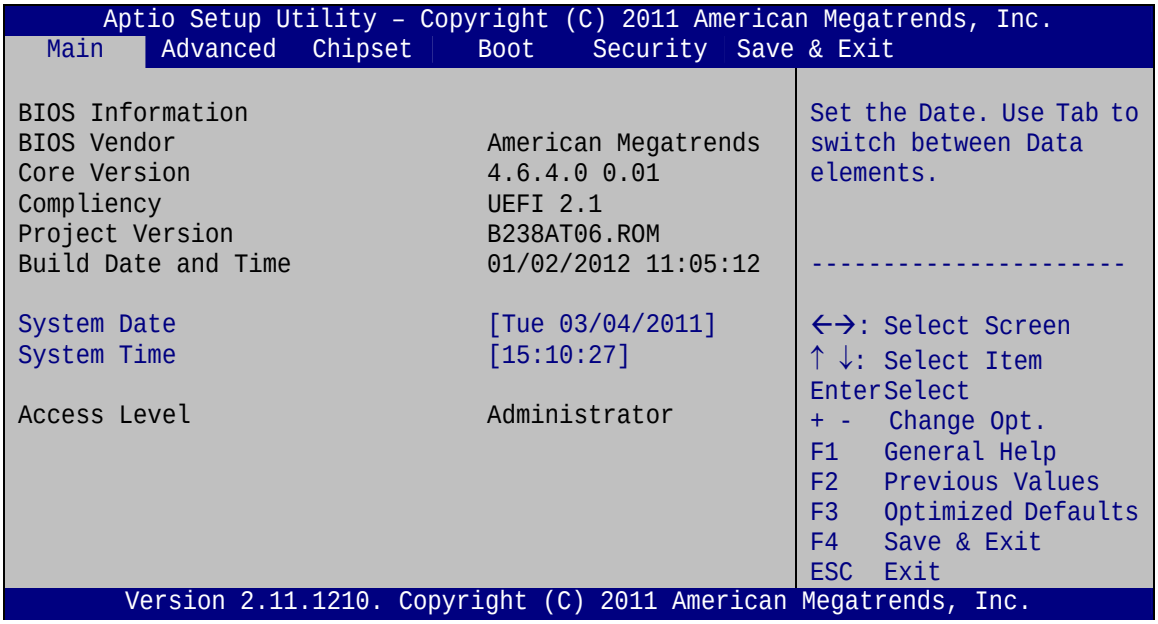
The **menu bar** on top of the BIOS screen has the following main items:

- Main – Changes the basic system configuration.
- Advanced – Changes the advanced system settings.
- Chipset – Changes the chipset settings.
- Boot – Changes the system boot configuration.
- Security – Sets User and Supervisor Passwords.
- Save & Exit – Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

5.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered. The **Main** menu gives an overview of the basic system information.



BIOS Menu 1: Main

➔ **System Overview**

The **BIOS Information** lists a brief summary of the BIOS. The fields in **BIOS Information** cannot be changed. The items shown in the system overview include:

- **BIOS Vendor:** Installed BIOS vendor
- **Core Version:** Current BIOS version
- **Project Version:** the board version
- **Build Date and Time:** Date and time the current BIOS version was made

The System Overview field also has two user configurable fields:

➔ **System Date [xx/xx/xx]**

Use the **System Date** option to set the system date. Manually enter the day, month and year.

➔ **System Time [xx:xx:xx]**

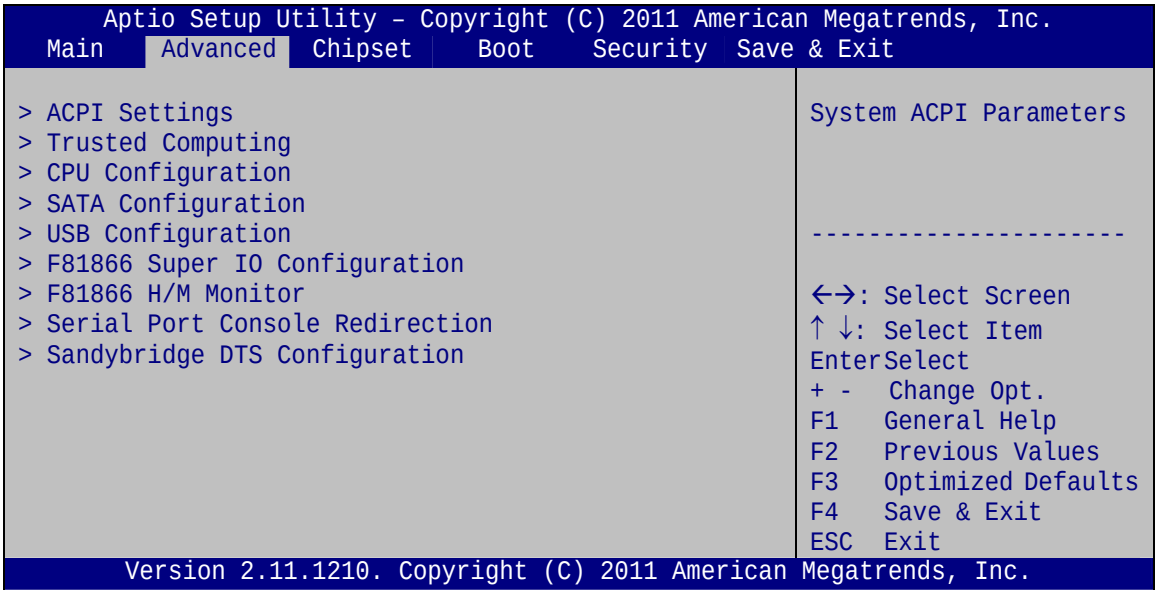
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

Use the **Advanced** menu (**BIOS Menu 2**) to configure the CPU and peripheral devices through the following sub-menus:

WARNING!

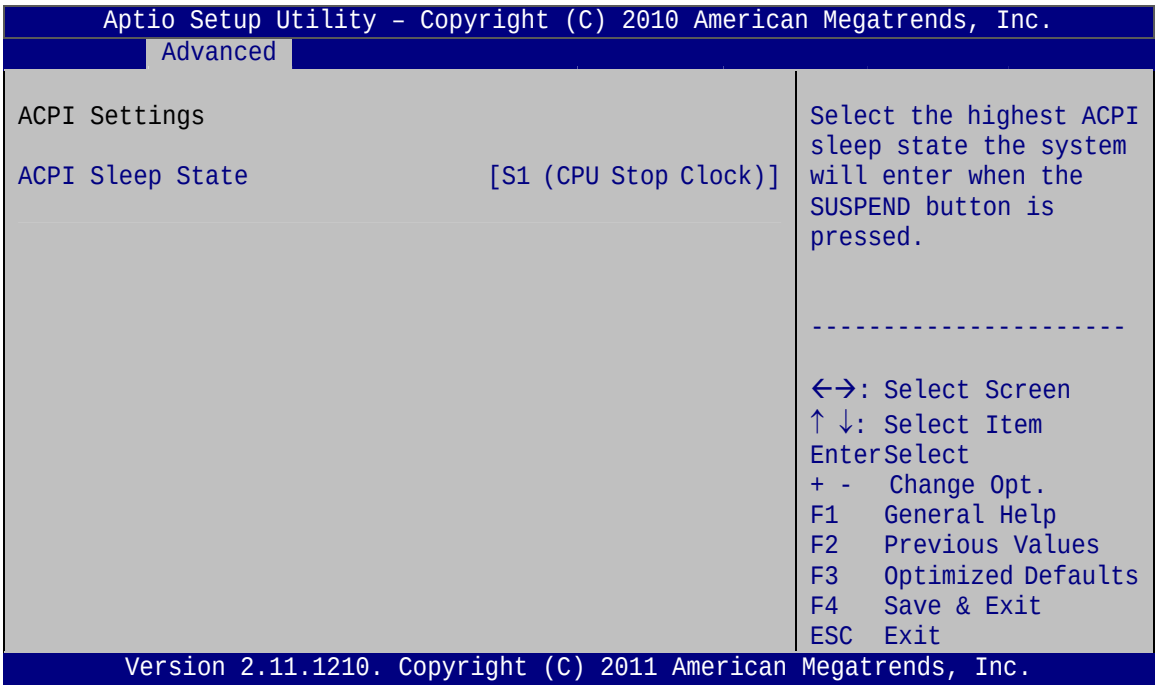
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.



BIOS Menu 2: Advanced

5.3.1 ACPI Settings

The **ACPI Settings** menu (**BIOS Menu 3**) configures the Advanced Configuration and Power Interface (ACPI) options.



BIOS Menu 3: ACPI Configuration

➔ **ACPI Sleep State [S1 (CPU Stop Clock)]**

Use the **ACPI Sleep State** option to specify the sleep state the system enters when it is not being used.

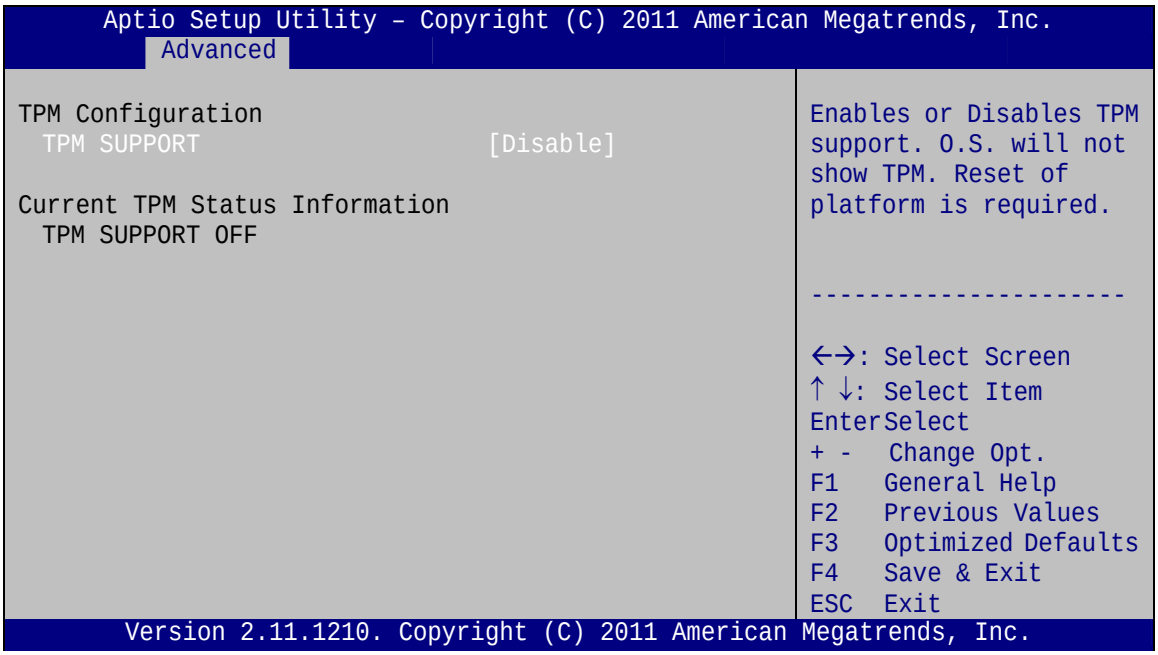
➔ **Suspend Disabled**

➔ **S1 (CPU Stop Clock)** **DEFAULT** The system enters S1(POS) sleep state. The system appears off. The CPU is stopped; RAM is refreshed; the system is running in a low power mode.

➔ **S3 (Suspend to RAM)** The caches are flushed and the CPU is powered off. Power to the RAM is maintained. The computer returns slower to a working state, but more power is saved.

5.3.2 Trusted Computing

Use the **Trusted Computing** menu (**BIOS Menu 4**) to configure settings related to the Trusted Computing Group (TCG) Trusted Platform Module (TPM).



BIOS Menu 4: TPM Configuration

➔ **TPM Support [Disable]**

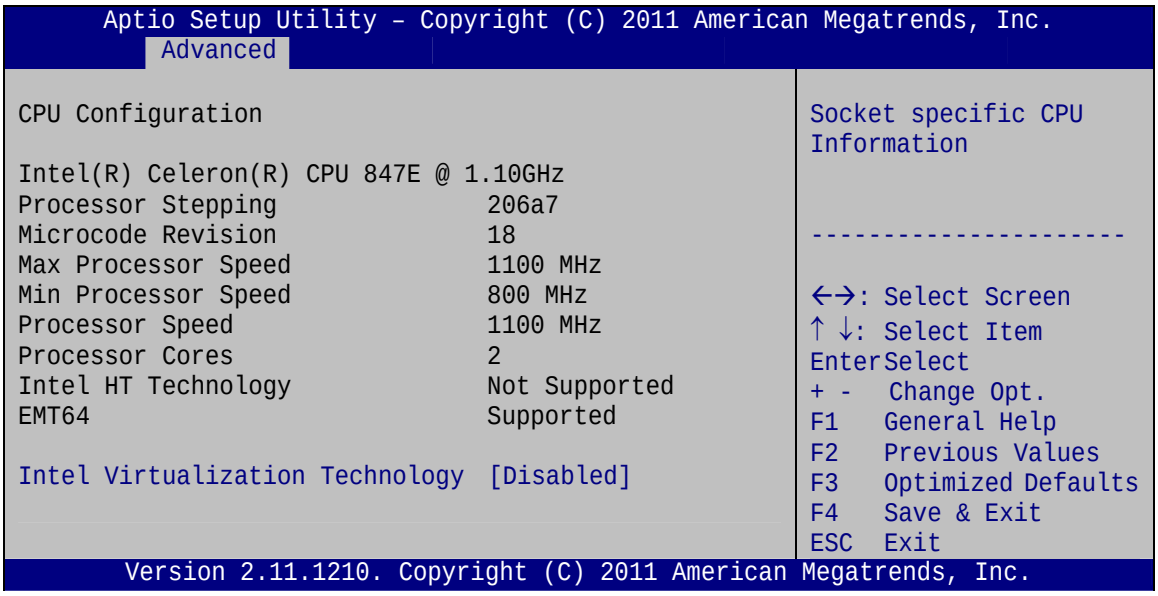
Use the **TPM Support** option to configure support for the TPM.

➔ **Disable** **DEFAULT** TPM support is disabled.

➔ **Enable** TPM support is enabled.

5.3.3 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 5**) to enter the **CPU Information** submenu or enable Intel Virtualization Technology.



BIOS Menu 5: CPU Configuration

The CPU Configuration menu (**BIOS Menu 5**) lists the following CPU details:

- Processor Type: Lists the brand name of the CPU being used
- Processor Stepping: Lists the CPU processing stepping
- Microcode Revision: Lists the microcode revision being used.
- Max processor Speed: Lists the maximum CPU processing speed.
- Min processor Speed: Lists the minimum CPU processing speed.
- Processor Speed: Lists the CPU processing speed
- Processor Cores: Lists the number of the processor core
- Intel HT Technology: Indicates if Intel HT Technology is supported by the CPU.
- EMT64: Indicates if EM64T is supported by the CPU.

➔ **Intel Virtualization Technology [Disabled]**

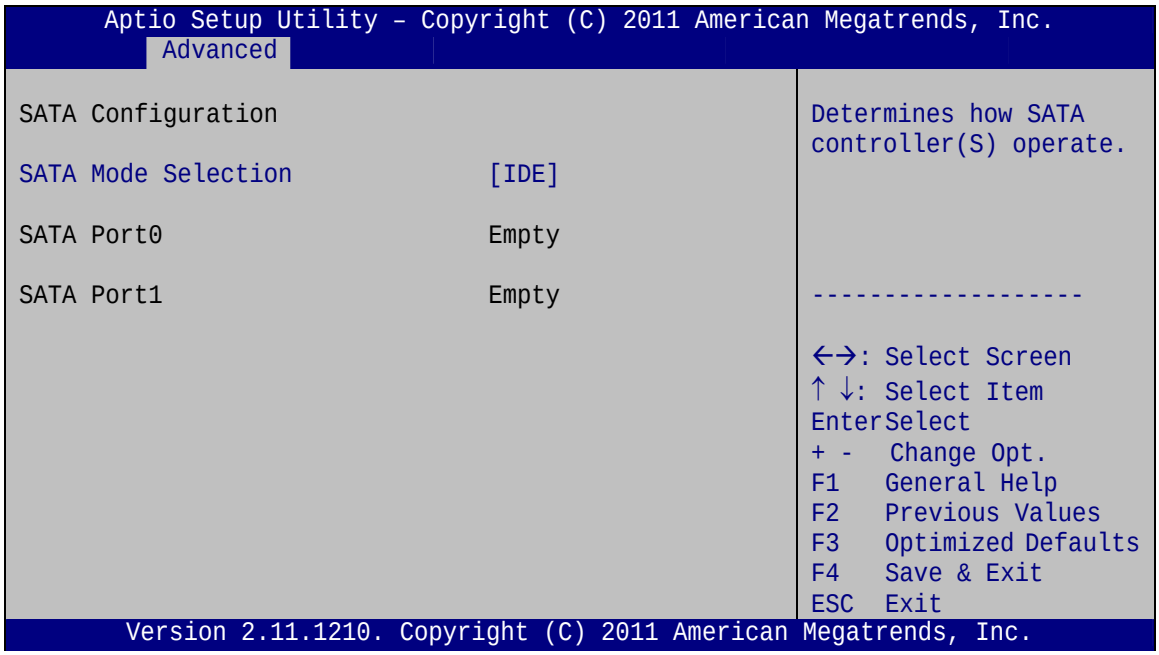
Use the **Intel Virtualization Technology** option to enable or disable virtualization on the system. When combined with third party software, Intel® Virtualization technology allows several OSs to run on the same system at the same time.

➔ **Disabled** **DEFAULT** Disables Intel Virtualization Technology.

➔ **Enabled** Enables Intel Virtualization Technology.

5.3.4 SATA Configuration

Use the **SATA Configuration** menu (**BIOS Menu 6**) to change and/or set the configuration of the SATA devices installed in the system.



BIOS Menu 6: SATA Configuration

➔ **SATA Mode Selection [IDE]**

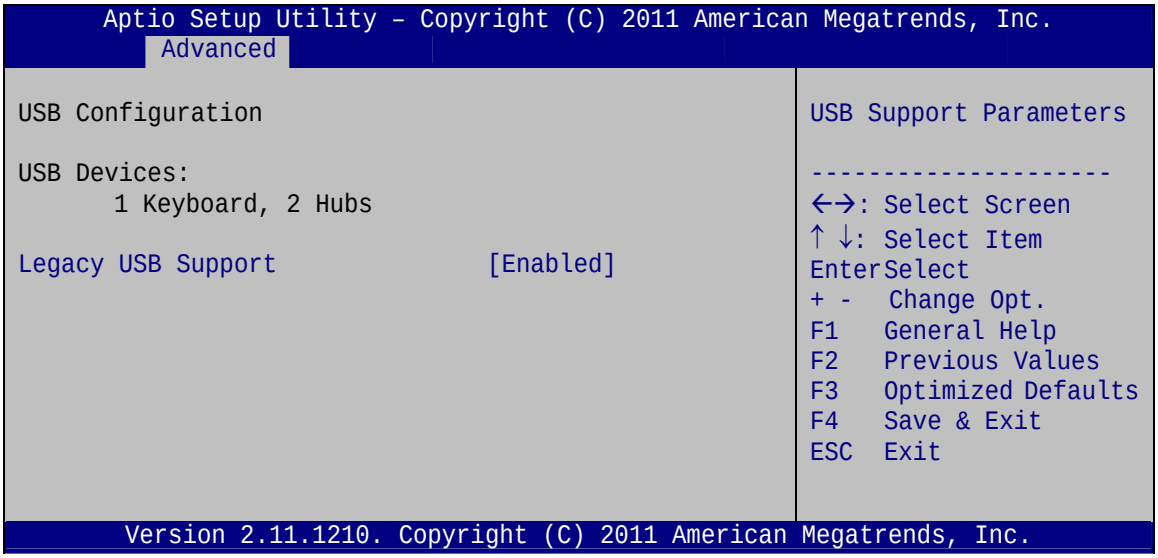
Use the **SATA Mode Selection** option to configure SATA devices as normal IDE devices.

➔ **IDE** **DEFAULT** Configures SATA devices as normal IDE device.

➔ **AHCI** Configures SATA devices as AHCI device.

5.3.5 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 7**) to read USB configuration information and configure the USB settings.



BIOS Menu 7: USB Configuration

➔ **USB Devices**

The **USB Devices Enabled** field lists the USB devices that are enabled on the system

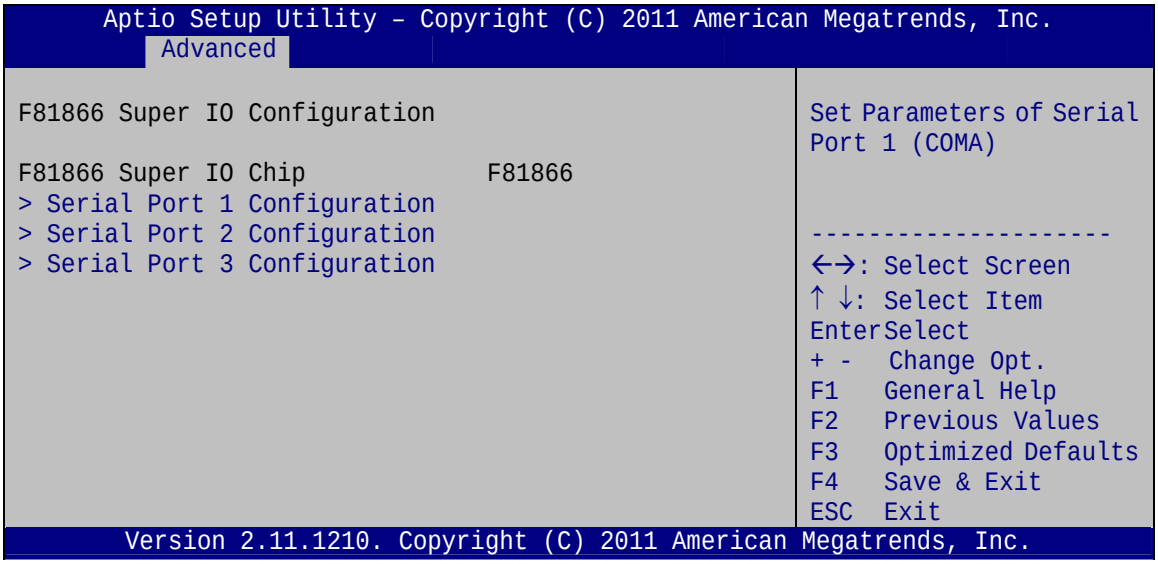
➔ **Legacy USB Support [Enabled]**

Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded onto the system.

➔	**Enabled**	**DEFAULT**	Legacy USB support enabled
➔	**Disabled**		Legacy USB support disabled

5.3.6 Super IO Configuration

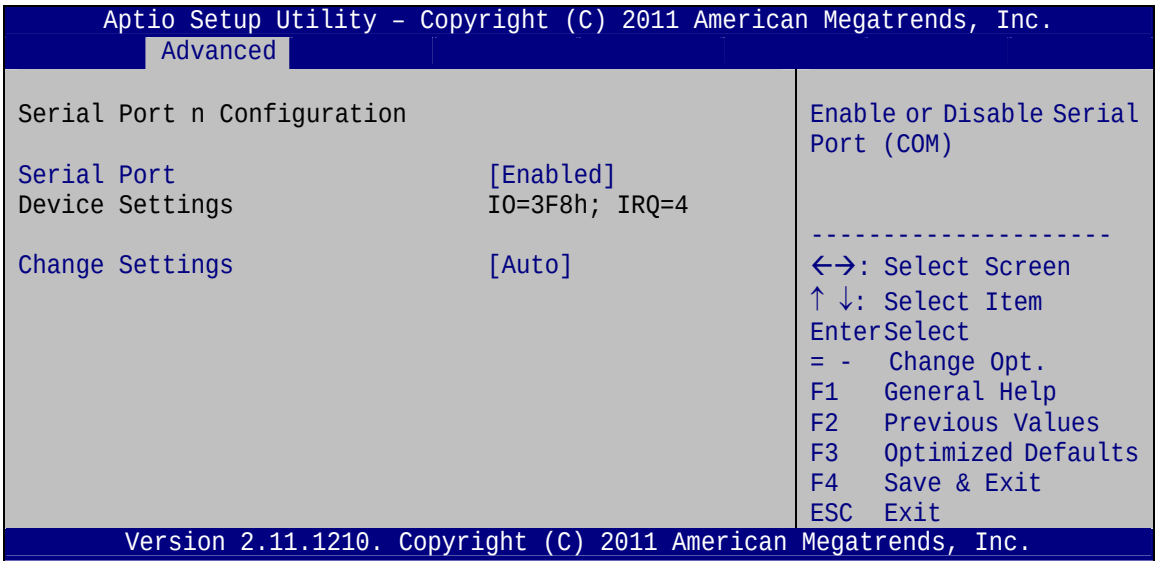
Use the **Super IO Configuration** menu (**BIOS Menu 8**) to set or change the configurations for the FDD controllers, parallel ports and serial ports.



BIOS Menu 8: Super IO Configuration

5.3.6.1 Serial Port n Configuration

Use the **Serial Port n Configuration** menu (**BIOS Menu 9**) to configure the serial port n.



BIOS Menu 9: Serial Port n Configuration Menu

5.3.6.1.1 Serial Port 1 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=3F8h; IRQ=4**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ4
➔ **IO=3F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12

5.3.6.1.2 Serial Port 2 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=2F8h; IRQ=3**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3
➔ **IO=3F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12

5.3.6.1.3 Serial Port 3 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=3E8h; IRQ=7**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ7
➔ **IO=3F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12

➔ **IO=2F0h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**	Serial Port I/O port address is 2F0h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2E0h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**	Serial Port I/O port address is 2E0h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12

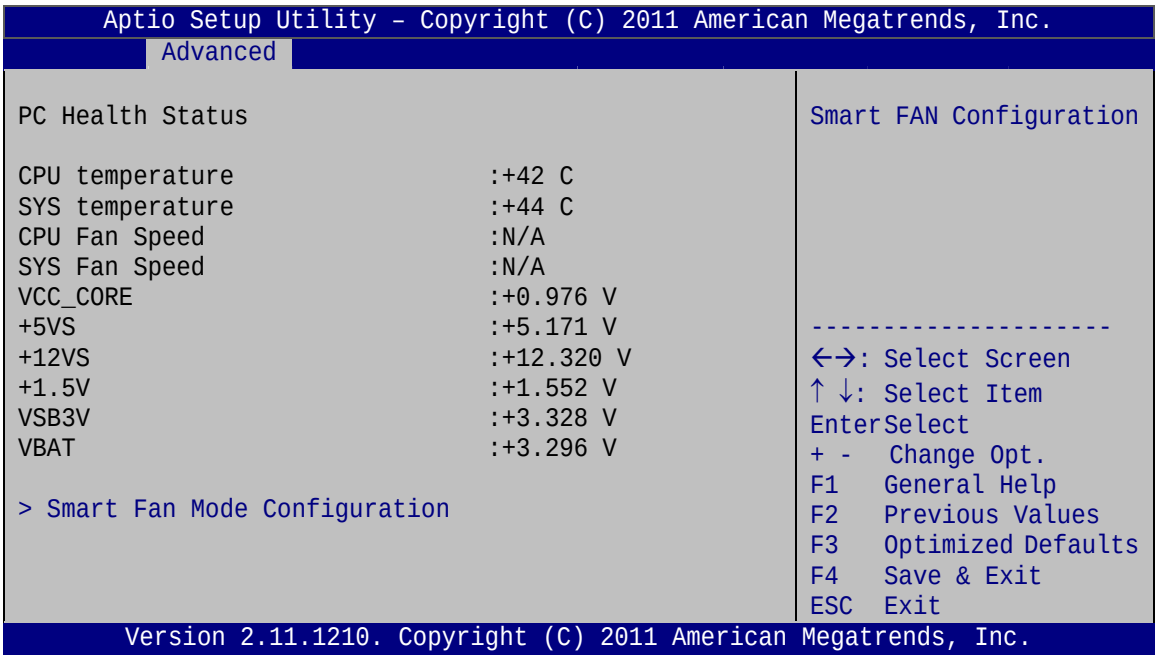
➔ **Device Mode [RS422/RS485]**

Use the **Device Mode** option to select the Serial Port 3 signaling mode.

➔ **Normal**		Serial Port 3 signaling mode is normal.
➔ **RS485**	**DEFAULT**	Serial Port 3 signaling mode is RS-485

5.3.7 H/W Monitor

The H/W Monitor menu (**BIOS Menu 10**) contains the fan configuration submenus and displays operating temperature, fan speeds and system voltages.



BIOS Menu 10: H/W Monitor

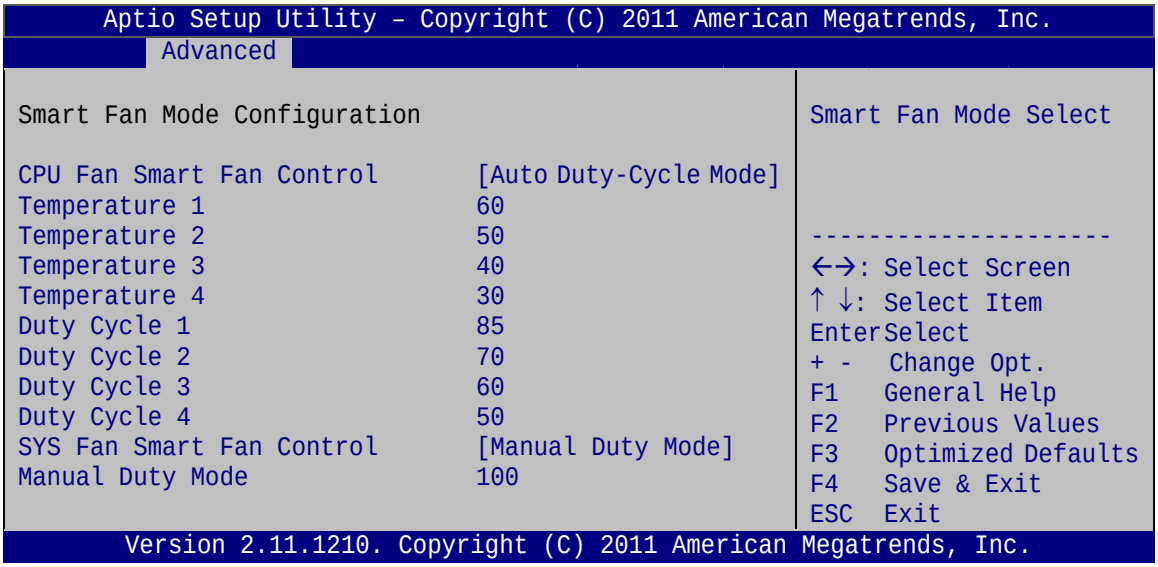
➔ PC Health Status

The following system parameters and values are shown. The system parameters that are monitored are:

- System Temperatures:
  - CPU Temperature
  - System Temperature
- Fan Speed:
  - CPU Fan Speed
  - System Fan Speed
- Voltages:
  - VCC_core
  - +5VS
  - +12VS
  - +1.5V
  - VSB3V
  - VBAT

5.3.7.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration submenu** (**BIOS Menu 11**) to configure fan temperature and speed settings.



BIOS Menu 11: Smart Fan Mode Configuration

➔ **CPU Fan Smart Fan Control [Auto Duty-Cycle Mode]**

Use the **CPU Smart Fan control** option to configure the CPU Smart Fan.

➔ **Manual Mode**	**RPM**	The fan spins at the speed set in Manual by RPM settings
➔ **Manual Mode**	**Duty**	The fan spins at the speed set in Manual by Duty-Cycle settings
➔ **Auto Mode**	**RPM**	The fan adjusts its speed using Auto by RPM settings
➔ **Auto Duty-Cycle Mode**	**DEFAULT**	The fan adjusts its speed using Auto by Duty-Cycle settings

➔ **Temperature n**

Use the + or – key to change the fan **Temperature n** value. Enter a decimal number between 0 and 100.

➔ **Duty Cycle n**

Use the + or – key to change the fan **Duty Cycle n** value. Enter a decimal number between 0 and 100.

➔ **SYS Fan Smart Fan Control [Manual Duty Mode]**

Use the **SYS Fan Smart Fan Control** option to configure the CPU Smart Fan.

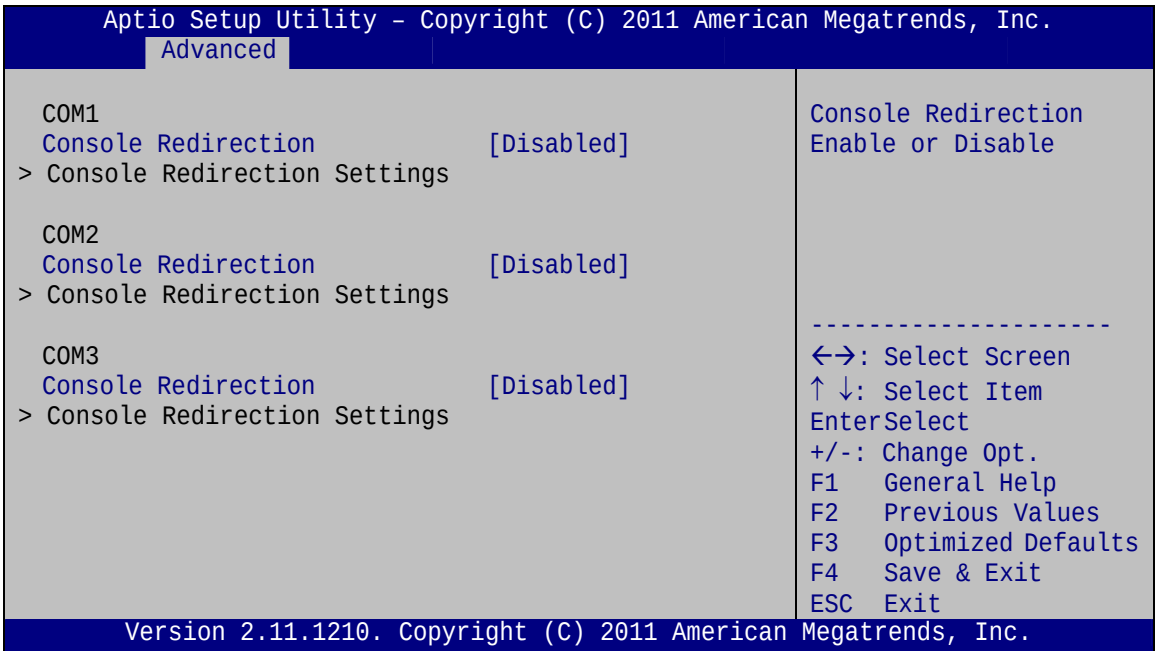
➔ **Manual Mode RPM**	The fan spins at the speed set in Manual by RPM settings
➔ **Manual Mode Duty DEFAULT**	The fan spins at the speed set in Manual by Duty-Cycle settings
➔ **Auto RPM Mode**	The fan adjusts its speed using Auto by RPM settings
➔ **Auto Duty-Cycle Mode**	The fan adjusts its speed using Auto by Duty-Cycle settings

➔ **Manual Duty Mode [100]**

Use the + or – key to change the fan **Manual Duty Mode** value. Enter a decimal number between 0 and 100.

5.3.8 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 12**) allows the console redirection options to be configured. Console redirection allows users to maintain a system remotely by re-directing keyboard input and text output through the serial port.



BIOS Menu 12: Serial Port Console Redirection

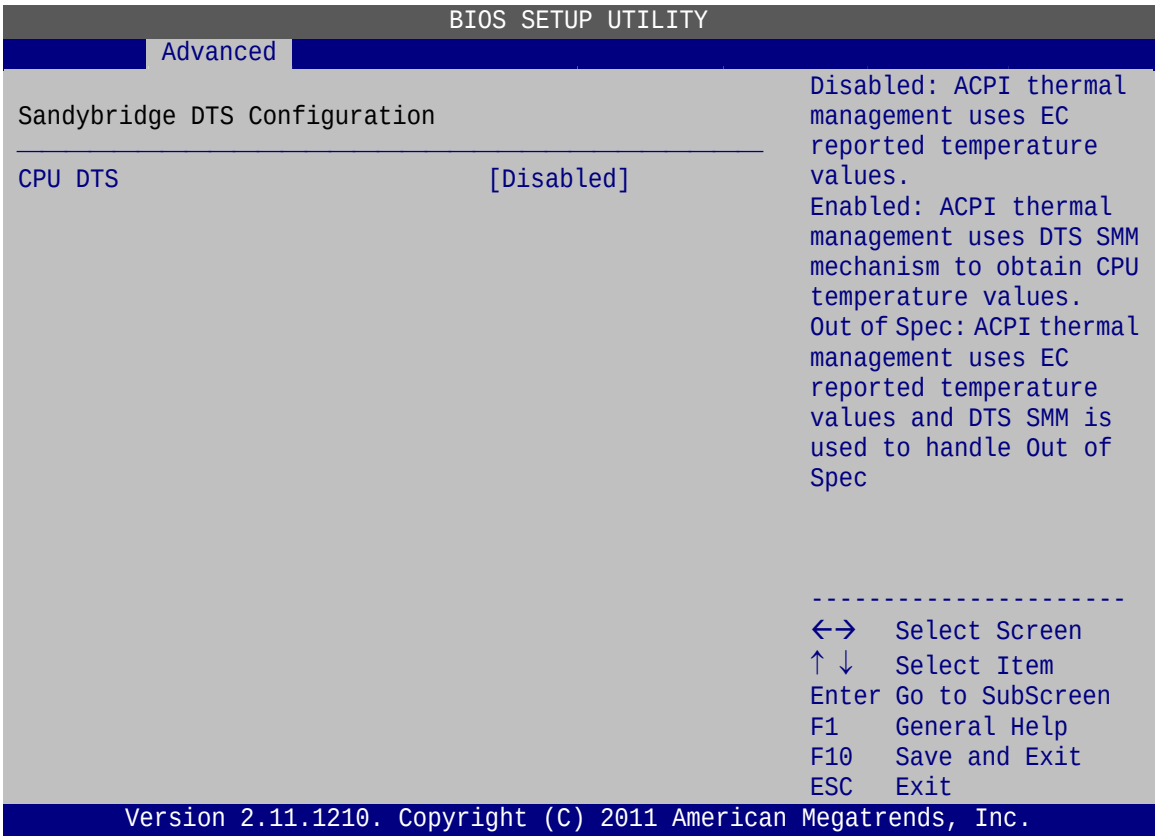
➔ **Console Redirection [Disabled]**

Use **Console Redirection** option to enable or disable the console redirection function.

➔	**Disabled**	**DEFAULT**	Disabled the console redirection function
➔	**Enabled**		Enabled the console redirection function

5.3.9 Sandybridge DTS Configuration

Use the **Sandybridge DTS Configuration** menu (**BIOS Menu 13**) to configure CPU DTS.



BIOS Menu 13: IEI Feature

➔ **CPU DTS [Disabled]**

Use the **CPU DTS** BIOS option to configure how the ACPI thermal management obtain CPU temperature values.

➔ **Disabled** **DEFAULT** ACPI thermal management uses EC reported temperature values.

➔ **Enabled** ACPI thermal management uses DTS SMM mechanism to obtain CPU temperature values.

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 14**) to access the Northbridge, Southbridge, Integrated Graphics, and ME Subsystem configuration menus.

WARNING!

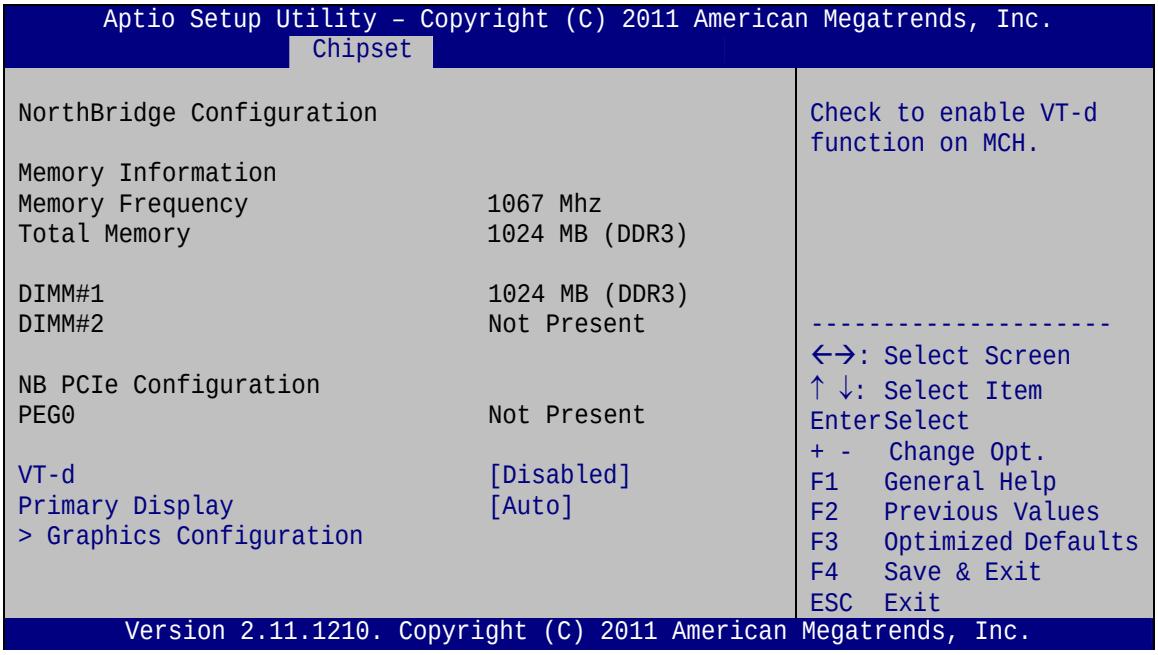
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

```
      Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
  Main    Advanced  Chipset    Boot    Security  Save & Exit

> NorthBridge Configuration                    North Bridge Parameters
> SouthBridge Configuration

                                               ---------------------
                                               ←→: Select Screen
                                               ↑ ↓: Select Item
                                               EnterSelect
                                               + -   Change Opt.
                                               F1    General Help
                                               F2    Previous Values
                                               F3    Optimized Defaults
                                               F4    Save & Exit
                                               ESC   Exit
        Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.
```

BIOS Menu 14: Chipset

5.4.1 NorthBridge Configuration

Use the **NorthBridge Configuration** menu (**BIOS Menu 15**) to configure the Northbridge chipset.



BIOS Menu 15:Northbridge Configuration

➔ **VT-d [Disabled]**

Use the **VT-d** option to enable or disable VT-d support.

➔ **Disabled**	**DEFAULT**	Disables VT-d support.
➔ **Enabled**		Enables VT-d support.

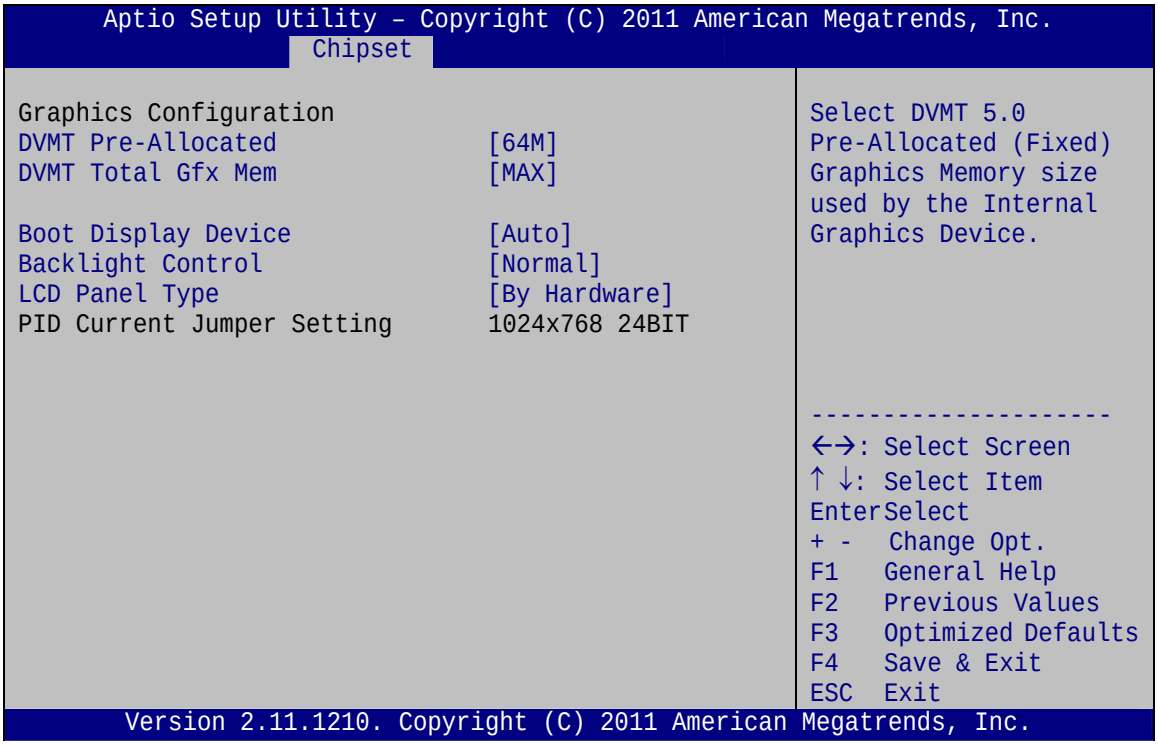
➔ **Primary Display [Auto]**

Use the **Primary Display** option to select the primary display controller the system uses. The following options are available:

- Auto **DEFAULT**
- IGFX
- PCI

5.4.1.1 Graphics Configuration

Use the **Graphics Configuration** menu to configure the video device connected to the system.



BIOS Menu 16:Graphics Configuration

➔ **DVMT Pre-Allocated [64MB]**

Use the **DVMT Pre-Allocated** option to specify the amount of memory that can be allocated as graphics memory. Configuration options are listed below.

- 32M
- 64M **DEFAULT**
- 128M
- 256M
- 512M

➔ **DVMT Total Gfx Mem [MAX]**

Use the **DVMT Total Gfx Mem** option to specify the total amount of memory that can be allocated as graphics memory. Configuration options are listed below.

- 128M
- 256M
- MAX **DEFAULT**

➔ **Boot Display Device**

Use the **Boot Display Device** option to select the display device used by the system when it boots. Configuration options are listed below.

- Auto **DEFAULT**
- CRT
- LVDS

➔ **Backlight Control [Normal]**

Use the **Backlight Control** option to select backlight control mode.

➔ **Normal** **DEFAULT** Brightest at low voltage level.

➔ **Inverted** Brightest at high voltage level.

➔ **LCD Panel Type [By Hardware]**

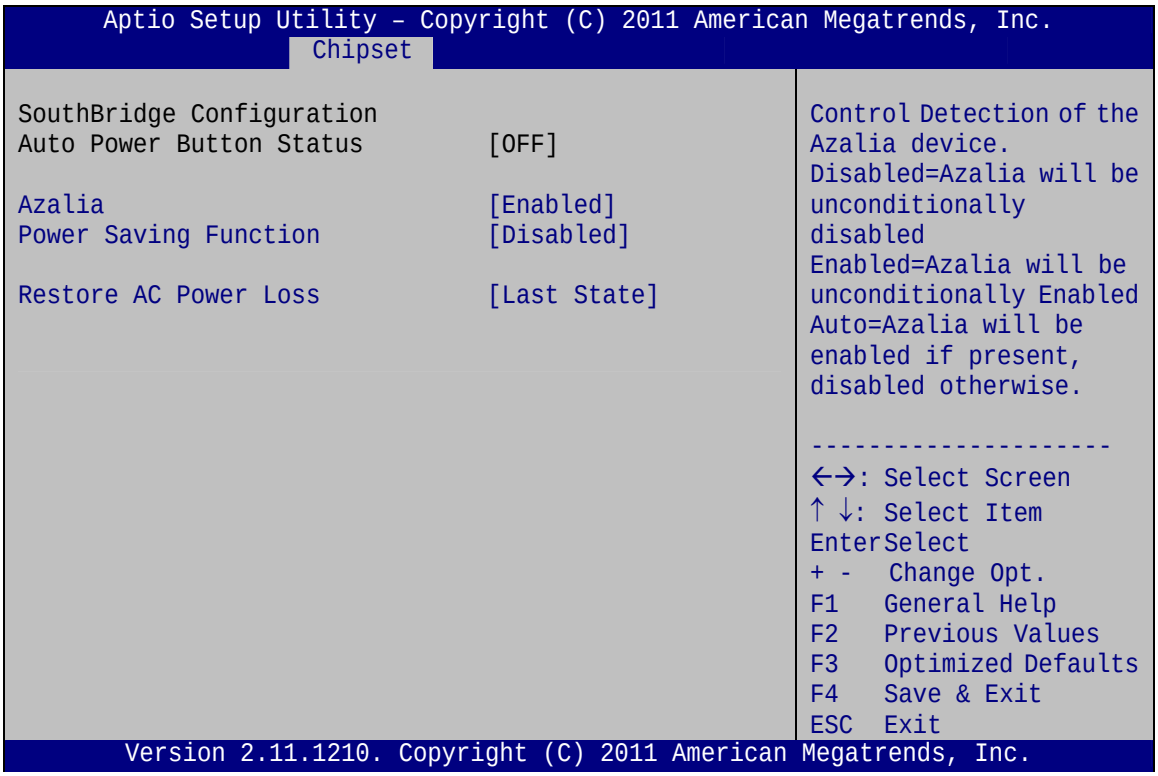
Use the **LCD Panel Type** option to select the type of flat panel connected to the system. Configuration options are listed below.

- By Hardware **DEFAULT**
- 640x480 (18bit)
- 800x600 (18bit)
- 1024x768 (18bit)
- 1024x768 (24bit)
- 1280x800 (18bit)
- 1280x1024 (48bit)
- 1280x768 (18bit)

- 1366x768 (24bit)
- 1440x900 (48bit)
- 1600x900 (48bit)
- 1600x1200 (48bit)
- 1680x1050 (48bit)
- 1920x1080 (48bit)
- 1920x1200 (48bit)

5.4.2 Southbridge Configuration

Use the **Southbridge Configuration** menu (**BIOS Menu 17**) to configure the Southbridge chipset.



BIOS Menu 17: Southbridge Chipset Configuration

➔ **Azalia [Enabled]**

Use the **Azalia** option to enable or disable the High Definition Audio controller.

➔ **Disabled** The onboard High Definition Audio controller is disabled

➔ **Enabled** **DEFAULT** The onboard High Definition Audio controller is detected automatically and enabled

➔ **Power Saving Function [Disabled]**

Use the **Power Saving Function** option to enable or disable the power saving function.

➔ **Disabled** **DEFAULT** The power saving function is disabled

➔ **Enabled** The power saving function is enabled

➔ **Restore on AC Power Loss [Last State]**

Use the **Restore on AC Power Loss** BIOS option to specify what state the system returns to if there is a sudden loss of power to the system.

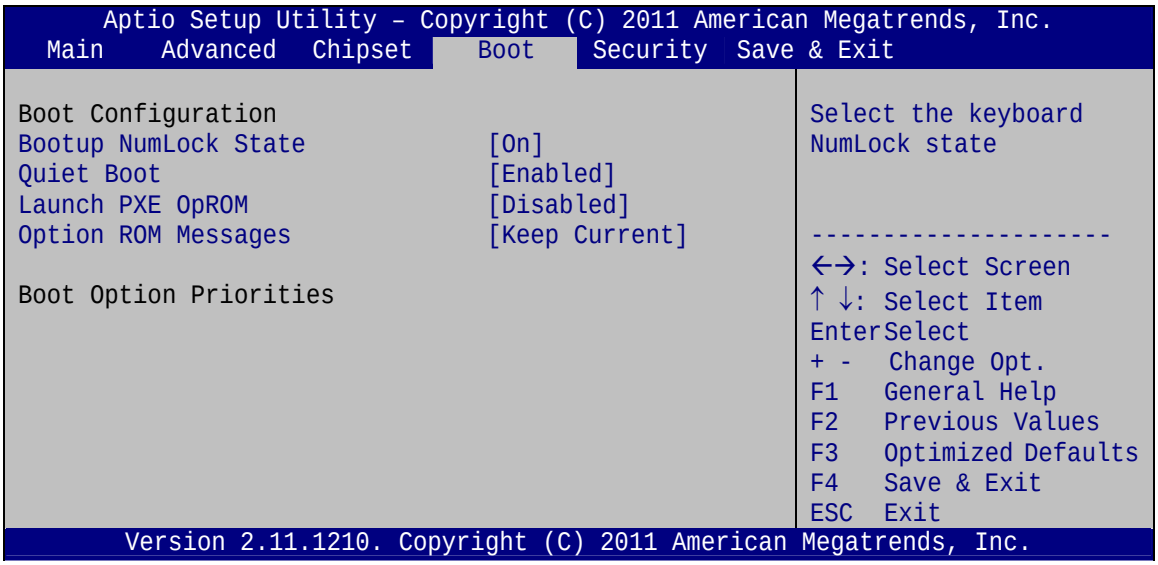
➔ **Power Off** The system remains turned off

➔ **Power On** The system turns on

➔ **Last State** **DEFAULT** The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off.

5.5 Boot

Use the **Boot** menu (**BIOS Menu 18**) to configure system boot options.



BIOS Menu 18: Boot

➔ **Bootup NumLock State [On]**

Use the **Bootup NumLock State** BIOS option to specify if the number lock setting must be modified during boot up.

➔ **On** **DEFAULT** Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

➔ **Off** Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.

➔ **Quiet Boot [Enabled]**

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

➔	**Disabled**		Normal POST messages displayed
➔	**Enabled**	**DEFAULT**	OEM Logo displayed instead of POST messages

➔ **Launch PXE OpROM [Disabled]**

Use the **Launch PXE OpROM** option to enable or disable boot option for legacy network devices.

➔	**Disabled**	**DEFAULT**	Ignore all PXE Option ROMs
➔	**Enabled**		Load PXE Option ROMs

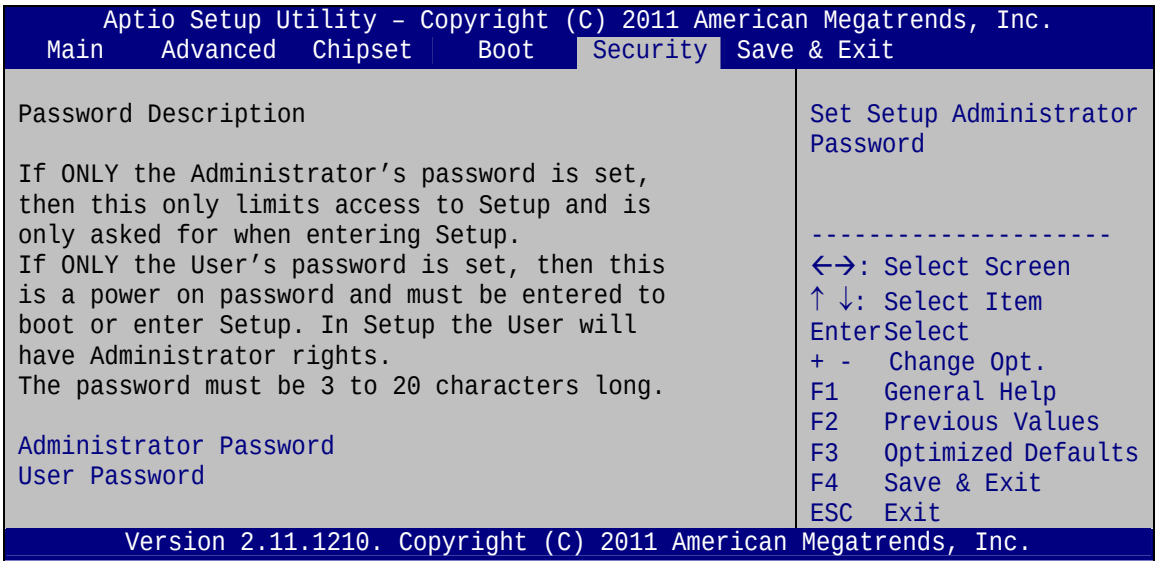
➔ **Option ROM Messages [Keep Current]**

Use the **Option ROM Messages** option to set the Option ROM display mode.

➔	**Force BIOS**		Sets display mode to force BIOS.
➔	**Keep Current**	**DEFAULT**	Sets display mode to current.

5.6 Security

Use the **Security** menu (**BIOS Menu 19**) to set system and user passwords.



BIOS Menu 19: Security

➔ **Administrator Password**

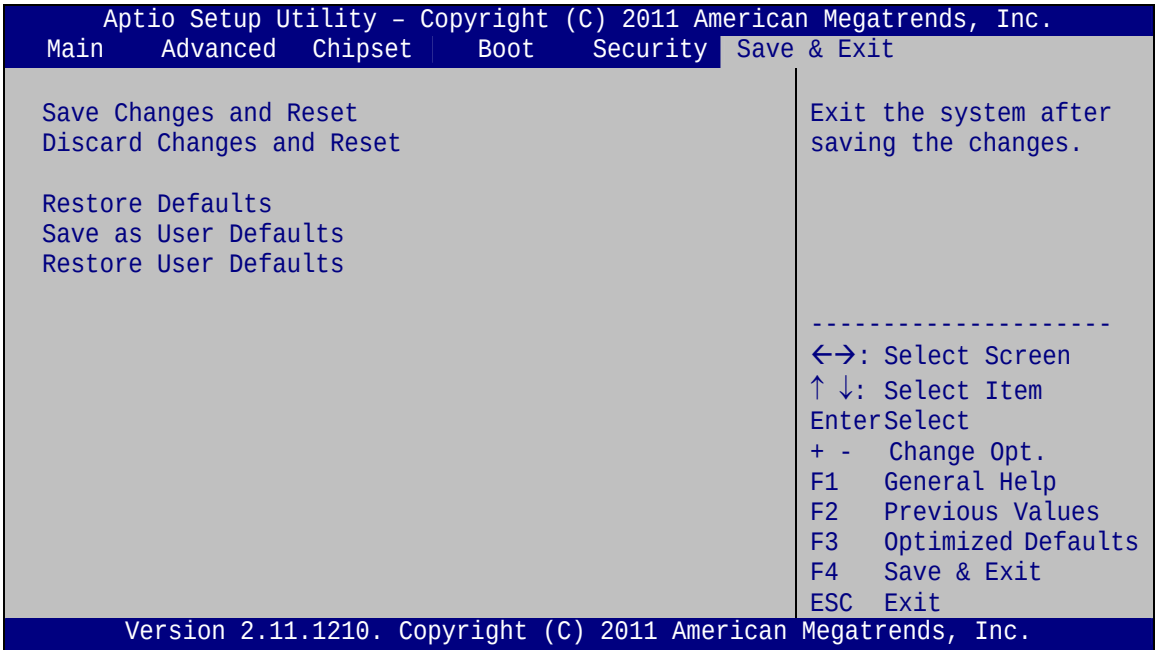
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

Use the **User Password** to set or change a user password.

5.7 Exit

Use the **Exit** menu (**BIOS Menu 20**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 20:Exit

➔ **Save Changes and Reset**

Use the **Save Changes and Reset** option to save the changes made to the BIOS options and reset the system.

➔ **Discard Changes and Reset**

Use the **Discard Changes and Reset** option to exit the system without saving the changes made to the BIOS configuration setup program.

➔ **Restore Defaults**

Use the **Restore Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F3 key can be used for this operation.**

➔ **Save as User Defaults**

Use the **Save as User Defaults** option to save the changes done so far as user defaults.

➔ **Restore User Defaults**

Use the **Restore User Defaults** option to restore the user defaults to all the setup options.

Appendix

A

BIOS Options

Below is a list of BIOS configuration options in the BIOS chapter.

System Overview 65
System Date [xx/xx/xx] 65
System Time [xx:xx:xx] 66
ACPI Sleep State [S1 (CPU Stop Clock)] 67
TPM Support [Disable] 68
Intel Virtualization Technology [Disabled] 69
SATA Mode Selection [IDE] 70
USB Devices 71
Legacy USB Support [Enabled] 71
Serial Port [Enabled] 73
Change Settings [Auto] 73
Serial Port [Enabled] 74
Change Settings [Auto] 74
Serial Port [Enabled] 75
Change Settings [Auto] 75
Device Mode [RS422/RS485] 76
PC Health Status 77
CPU Fan Smart Fan Control [Auto Duty-Cycle Mode] 78
Temperature n 79
Duty Cycle n 79
SYS Fan Smart Fan Control [Manual Duty Mode] 79
Manual Duty Mode [100] 79
Console Redirection [Disabled] 80
CPU DTS [Disabled] 81
VT-d [Disabled] 83
Primary Display [Auto] 83
DVMT Pre-Allocated [64MB] 84
DVMT Total Gfx Mem [MAX] 85
Boot Display Device 85
Backlight Control [Normal] 85
LCD Panel Type [By Hardware] 85
Azalia [Enabled] 86
Power Saving Function [Disabled] 87

Restore on AC Power Loss [Last State] 87
Bootup NumLock State [On] 88
Quiet Boot [Enabled] 89
Launch PXE OpROM [Disabled] 89
Option ROM Messages [Keep Current] 89
Administrator Password 90
User Password 90
Save Changes and Reset 91
Discard Changes and Reset 91
Restore Defaults 91
Save as User Defaults 92
Restore User Defaults 92

Appendix

B

One Key Recovery

B.1 One Key Recovery Introduction

The IEI one key recovery is an easy-to-use front end for the Norton Ghost system backup and recovery tool. This tool provides quick and easy shortcuts for creating a backup and reverting to that backup or reverting to the factory default settings.

NOTE:

The latest One Key Recovery software provides an auto recovery function that allows a system running Microsoft Windows OS to automatically restore from the factory default image after encountering a Blue Screen of Death (BSoD) or a hang for around 10 minutes. Please refer to Section B.3 for the detailed setup procedure.

The IEI One Key Recovery tool menu is shown below.

Figure B-1: IEI One Key Recovery Tool Menu

Prior to using the IEI One Key Recovery tool (as shown in **Figure B-1**) to backup or restore Windows system, five setup procedures are required.

1. Hardware and BIOS setup (see **Section B.2.1**)
2. Create partitions (see **Section B.2.2**)
3. Install operating system, drivers and system applications (see **Section B.2.3**)
4. Build the recovery partition (see **Section B.2.4**)
5. Create factory default image (see **Section B.2.5**)

After completing the five initial setup procedures as described above, users can access the recovery tool by pressing <**F3**> while booting up the system. The detailed information of each function is described in **Section B.5**.

NOTE:

The initial setup procedures for Linux system are described in **Section B.3**.

B.1.1 System Requirement

NOTE:

The recovery CD can only be used with IEI products. The software will fail to run and a warning message will appear when used on non-IEI hardware.

To create the system backup, the main storage device must be split into two partitions (three partitions for Linux). The first partition will be for the operating system, while the second partition will be invisible to the operating system and contain the backup made by the one key recovery software.

The partition created for recovery images must be big enough to contain both the factory default image and the user backup image. The size must be calculated before creating the

partitions. Please take the following table as a reference when calculating the size of the partition.

	OS	OS Image after Ghost	Compression Ratio
Windows® 7	7 GB	5 GB	70%
Windows® XPE	776 MB	560 MB	70%
Windows® CE 6.0	36 MB	28 MB	77%

NOTE:

Specialized tools are required to change the partition size if the operating system is already installed.

B.1.2 Supported Operating System

The recovery CD is compatible with both Microsoft Windows and Linux operating systems (OS). The supported OS versions are listed below.

- Microsoft Windows
  - Windows 2000
  - Windows XP (Service Pack 2 or 3 required)
  - Windows Vista
  - Windows 7
  - Windows CE 5.0
  - Windows CE 6.0
  - Windows XP Embedded
  - Windows Embedded Standard 7

NOTE:

The auto recovery function (described in Section B.3) and the restore through LAN function (described in Section B.6) are not supported in the Windows CE 5.0/6.0 operating system environment.

- Linux
  - Fedora Core 12 (Constantine)
  - Fedora Core 11 (Leonidas)
  - Fedora Core 10 (Cambridge)
  - Fedora Core 8 (Werewolf)
  - Fedora Core 7 (Moonshine)
  - RedHat RHEL-5.4
  - RedHat 9 (Ghirke)
  - Ubuntu 8.10 (Intrepid)
  - Ubuntu 7.10 (Gutsy)
  - Ubuntu 6.10 (Edgy)
  - Debian 5.0 (Lenny)
  - Debian 4.0 (Etch)
  - SuSe 11.2
  - SuSe 10.3

NOTE:

Installing unsupported OS versions may cause the recovery tool to fail.

B.2 Setup Procedure for Windows

Prior to using the recovery tool to backup or restore, a few setup procedures are required.

Step 1: Hardware and BIOS setup (see **Section B.2.1**)

Step 2: Create partitions (see **Section B.2.2**)

Step 3: Install operating system, drivers and system applications (see **Section B.2.3**)

Step 4: Build the recovery partition (see **Section B.2.4**) or build the auto recovery partition (see **Section B.3**)

Step 5: Create factory default image (see **Section B.2.5**)

The detailed descriptions are described in the following sections.

NOTE:

The setup procedures described below are for Microsoft Windows operating system users. For Linux, most of the setup procedures are the same except for several steps described in **Section B.3**.

B.2.1 Hardware and BIOS Setup

Step 1: Make sure the system is powered off and unplugged.

Step 2: Install a hard drive or SSD in the system. An unformatted and unpartitioned disk is recommended.

Step 3: Connect an optical disk drive to the system and insert the recovery CD.

Step 4: Turn on the system.

Step 5: Press the <**DELETE**> key as soon as the system is turned on to enter the BIOS.

Step 6: Select the connected optical disk drive as the 1st boot device. (**Boot → Boot Device Priority → 1st Boot Device**).

Step 7: Save changes and restart the computer. Continue to the next section for instructions on partitioning the internal storage.

B.2.2 Create Partitions

To create the system backup, the main storage device must be split into two partitions (three partitions for Linux). The first partition will be for the operating system, while the second partition will be invisible to the operating system and contain the backup made by the one key recovery software.

Step 1: Put the recovery CD in the optical drive of the system.

Step 2: **Boot the system from recovery CD**. When prompted, press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient!

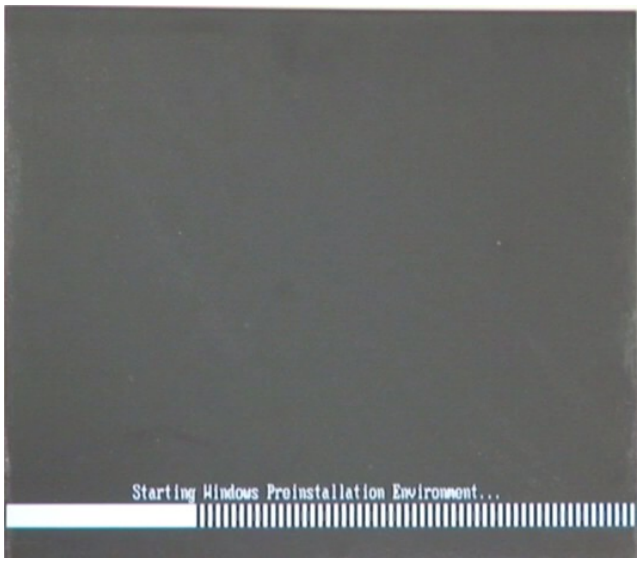


Figure B-2: Launching the Recovery Tool

Step 3: The recovery tool setup menu is shown as below.

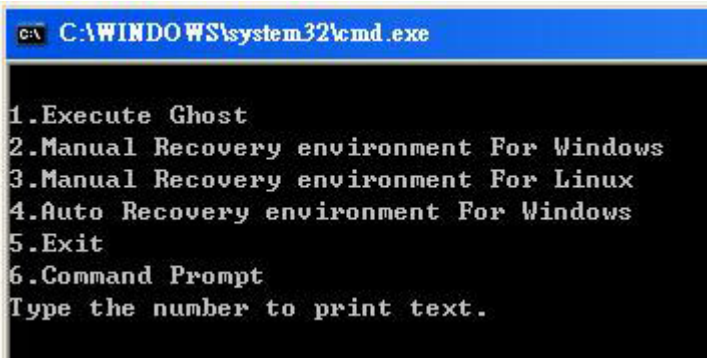


Figure B-3: Recovery Tool Setup Menu

Step 4: Press <**6**> then <Enter>.

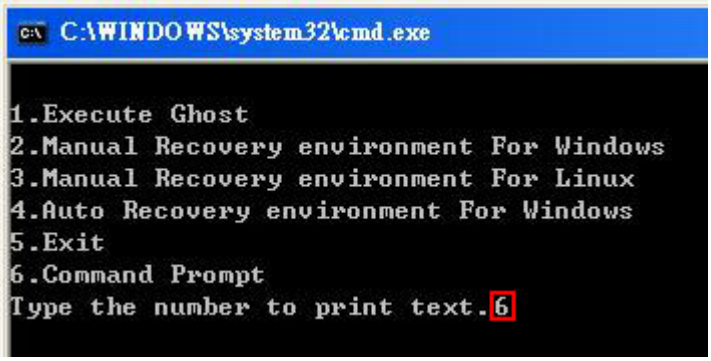


Figure B-4: Command Prompt

Step 5: The command prompt window appears. Type the following commands (marked in red) to create two partitions. One is for the OS installation; the other is for saving recovery files and images which will be an invisible partition.

(Press <Enter> after entering each line below)

system32>diskpart

DISKPART>list vol

DISKPART>sel disk 0

DISKPART>create part pri size= ___

DISKPART>assign letter=N

DISKPART>create part pri size= ___

DISKPART>assign letter=F

DISKPART>exit

system32>format N: /fs:ntfs /q /y

system32>format F: /fs:ntfs /q /v:Recovery /y

system32>exit

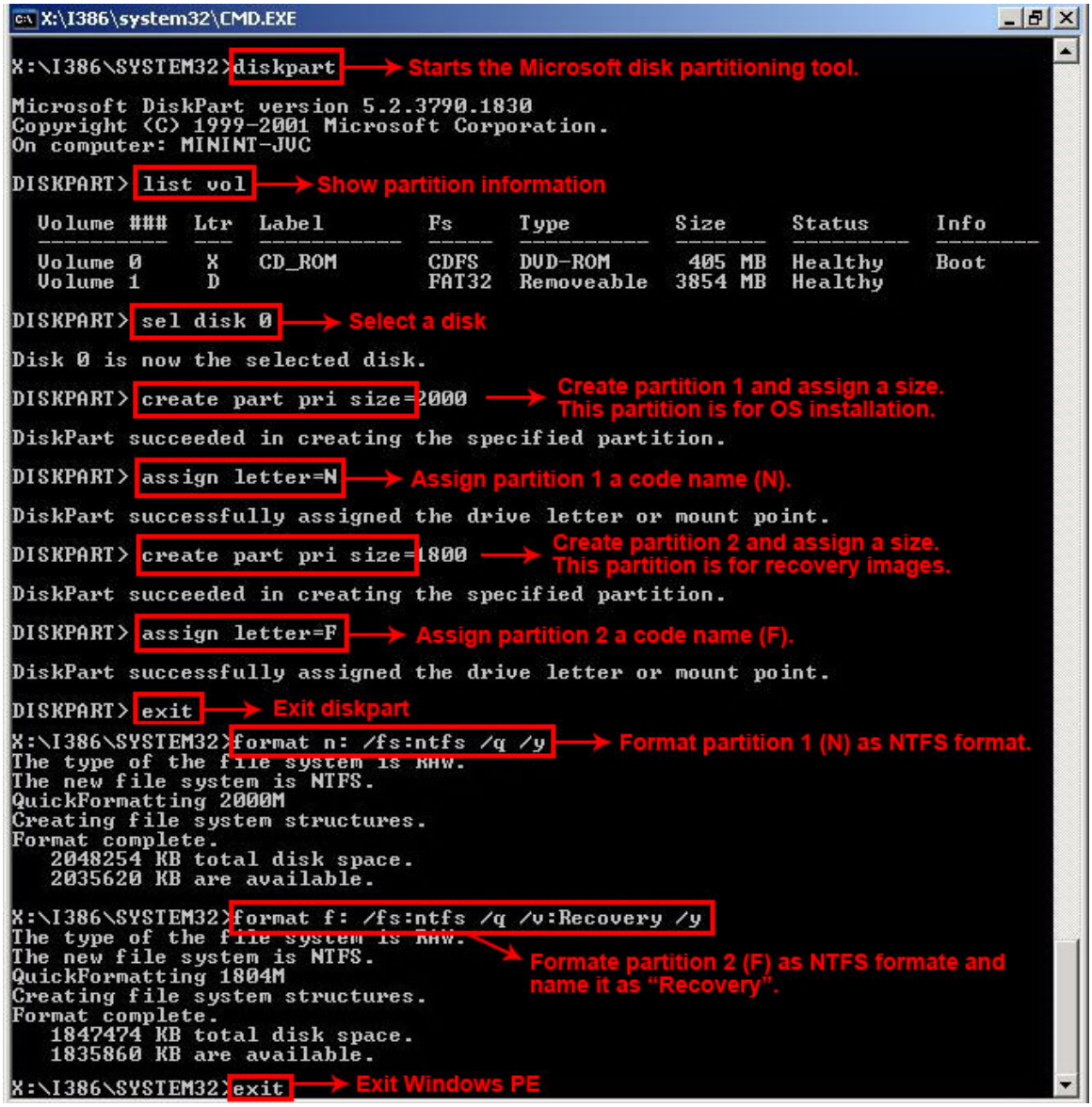
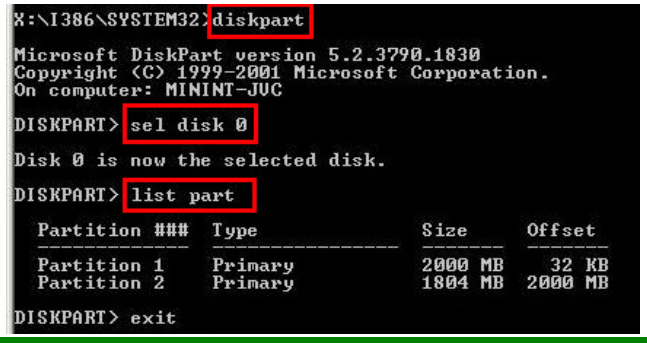


Figure B-5: Partition Creation Commands

NOTE:

Use the following commands to check if the partitions were created successfully.



Step 6: Press any key to exit the recovery tool and automatically reboot the system.

Please continue to the following procedure: Build the Recovery Partition.

B.2.3 Install Operating System, Drivers and Applications

Install the operating system onto the unlabelled partition. The partition labeled "Recovery" is for use by the system recovery tool and should not be used for installing the operating system or any applications.

NOTE:

The operating system installation program may offer to reformat the chosen partition. DO NOT format the partition again. The partition has already been formatted and is ready for installing the new operating system.

To install the operating system, insert the operating system installation CD into the optical drive. Restart the computer and follow the installation instructions.

B.2.4 Building the Recovery Partition

Step 1: Put the recover CD in the optical drive.

Step 2: Start the system.

Step 3: **Boot the system from the recovery CD**. When prompted, press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient!

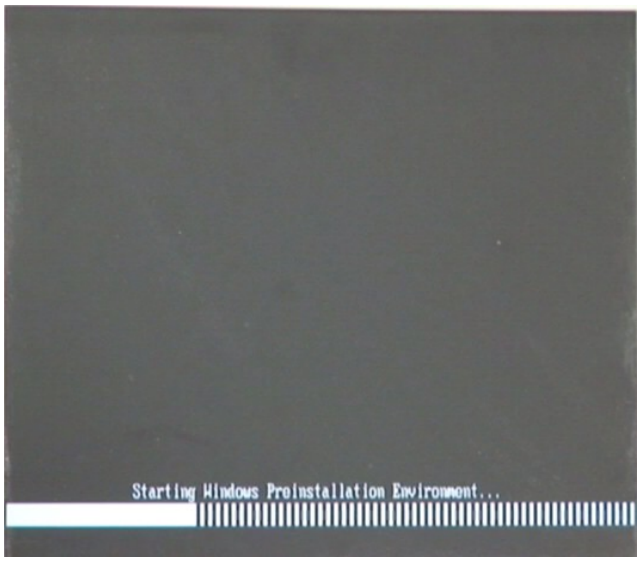


Figure B-6: Launching the Recovery Tool

Step 4: When the recovery tool setup menu appears, press <**2**> then <Enter>.

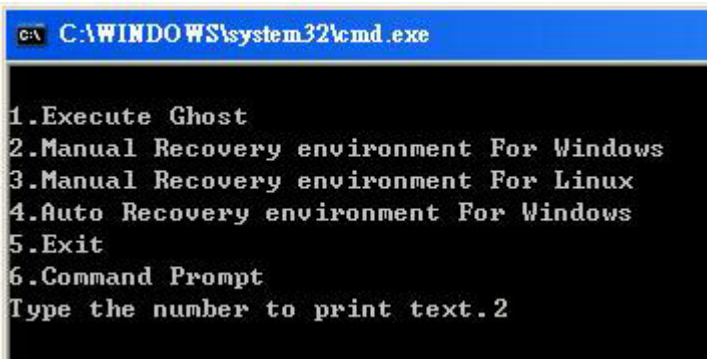


Figure B-7: Manual Recovery Environment for Windows

Step 5: The Symantec Ghost window appears and starts configuring the system to build a recovery partition. In this process the partition created for recovery files in **Section B.2.2** is hidden and the recovery tool is saved in this partition.

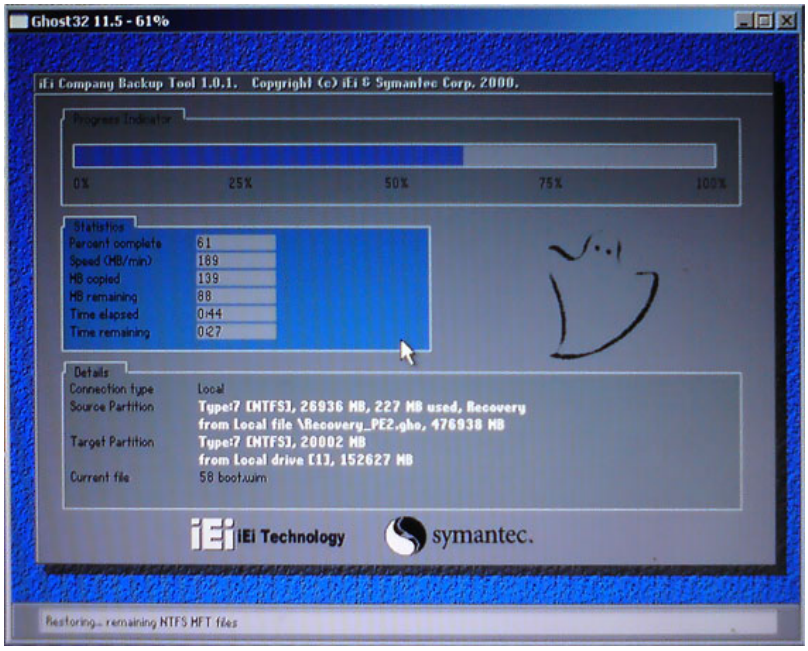


Figure B-8: Building the Recovery Partition

Step 6: After completing the system configuration, press any key in the following window to reboot the system.

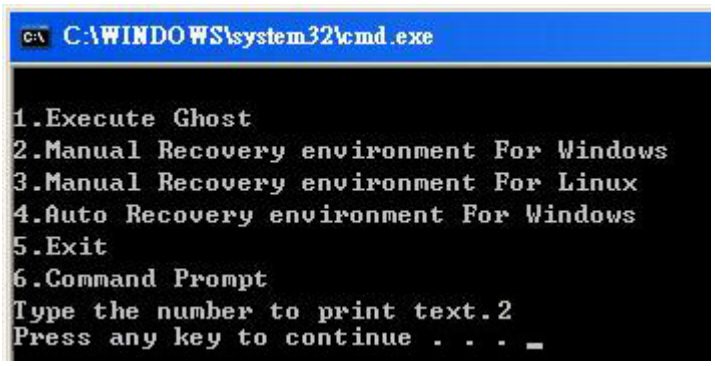


Figure B-9: Press Any Key to Continue

Step 7: Eject the recovery CD.

B.2.5 Create Factory Default Image

NOTE:

Before creating the factory default image, please configure the system to a factory default environment, including driver and application installations.

To create a factory default image, please follow the steps below.

Step 1: Turn on the system. When the following screen displays (**Figure B-10**), press the <**F3**> key to access the recovery tool. The message will display for 10 seconds, please press F3 before the system boots into the operating system.

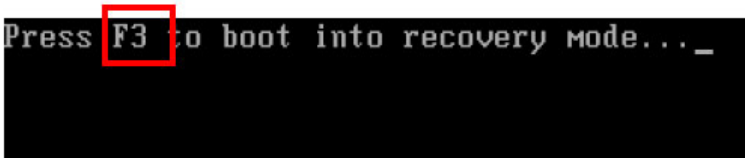


Figure B-10: Press F3 to Boot into Recovery Mode

Step 2: The recovery tool menu appears. Type <**4**> and press <**Enter**>. (**Figure B-11**)

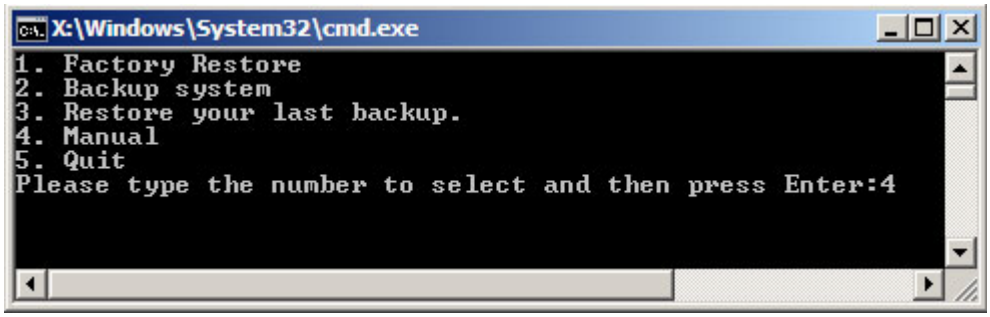


Figure B-11: Recovery Tool Menu

Step 3: The About Symantec Ghost window appears. Click **OK** button to continue.

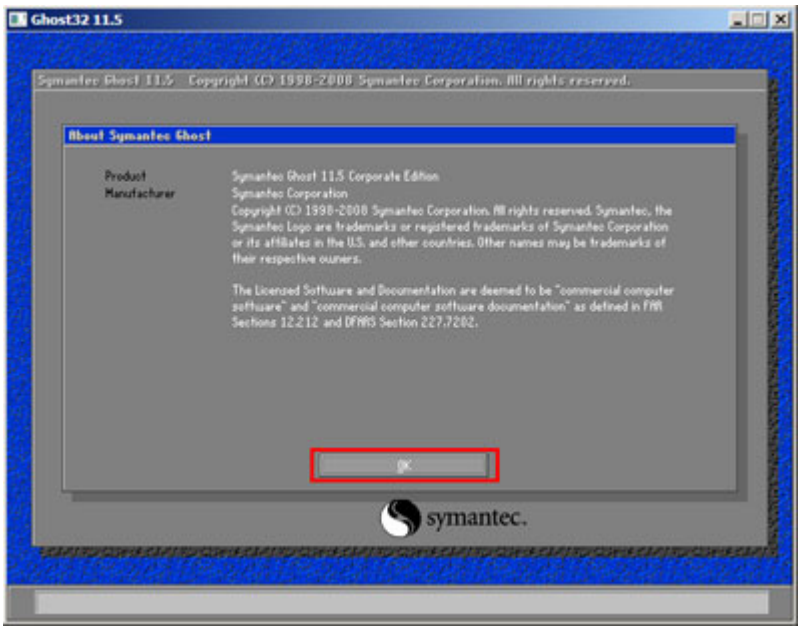


Figure B-12: About Symantec Ghost Window

Step 4: Use mouse to navigate to the option shown below (**Figure B-13**).

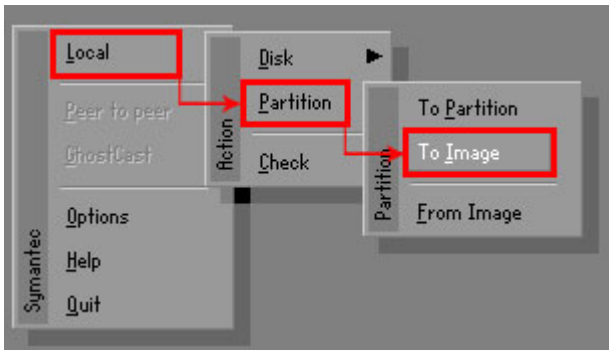


Figure B-13: Symantec Ghost Path

Step 5: Select the local source drive (Drive 1) as shown in **Figure B-14**. Then click OK.

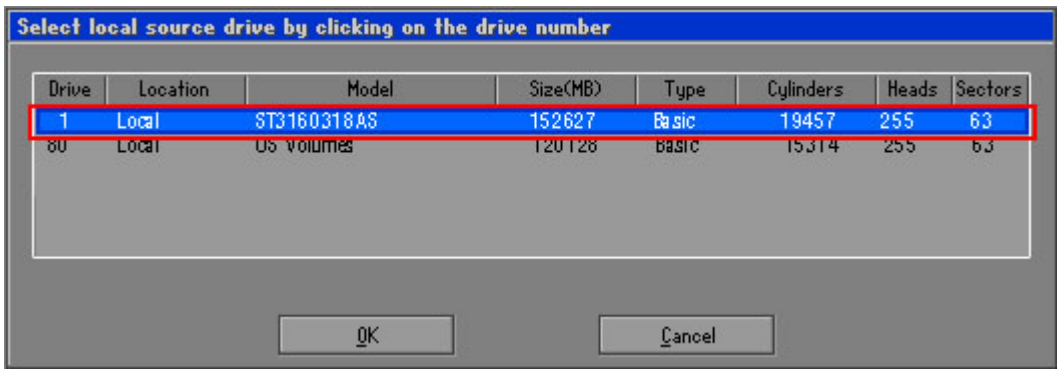


Figure B-14: Select a Local Source Drive

Step 6: Select a source partition (Part 1) from basic drive as shown in **Figure B-15**. Then click OK.

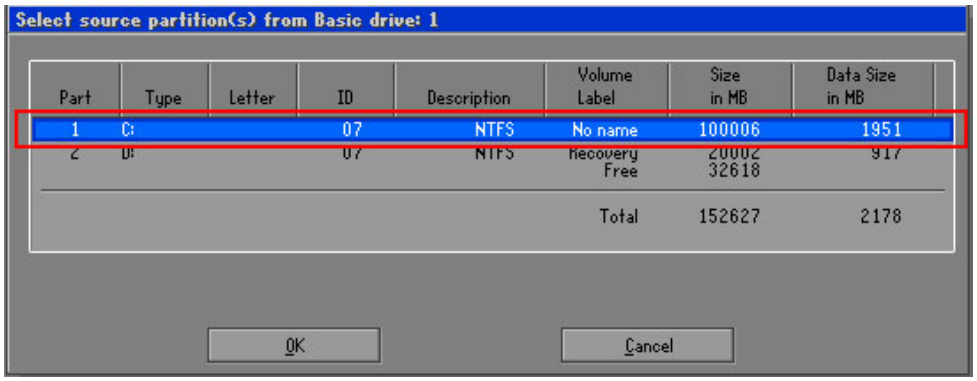


Figure B-15: Select a Source Partition from Basic Drive

Step 7: Select **1.2: [Recovery] NTFS drive** and enter a file name called **iei** (**Figure B-16**). Click **Save**. The factory default image will then be saved in the selected recovery drive and named IEI.GHO.

WARNING:

The file name of the factory default image must be **iei.GHO**.

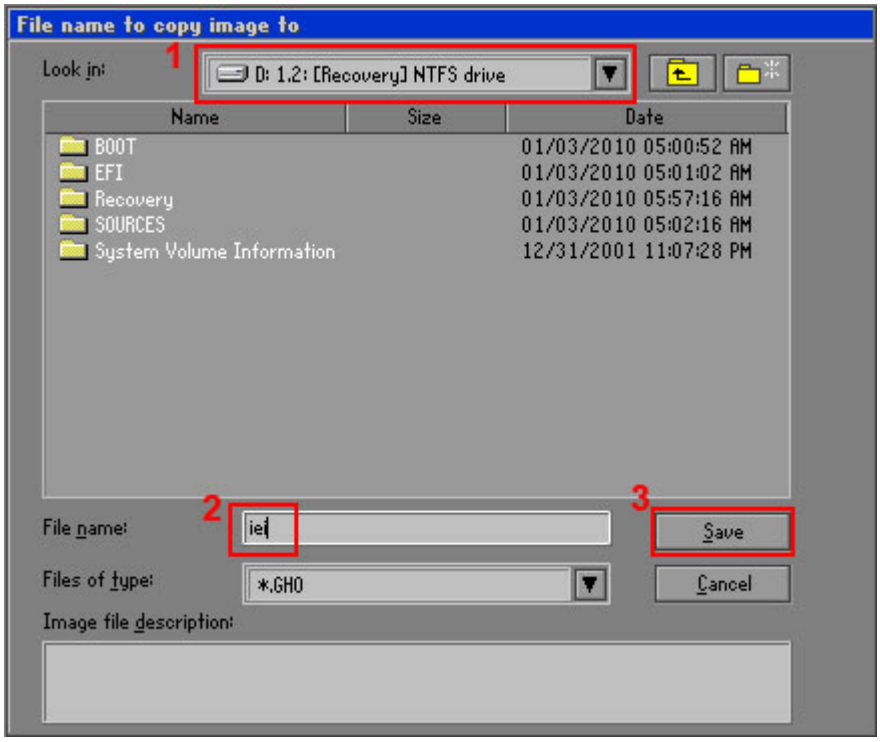


Figure B-16: File Name to Copy Image to

Step 8: When the Compress Image screen in **Figure B-17** prompts, click **High** to make the image file smaller.

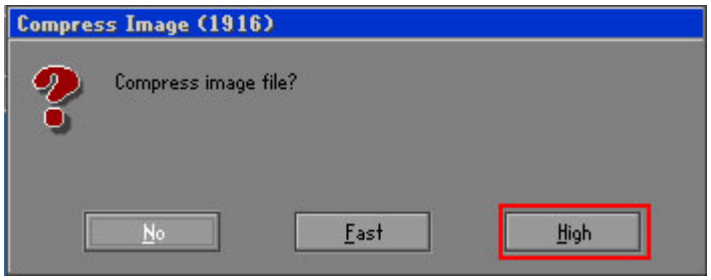


Figure B-17: Compress Image

Step 9: The Proceed with partition image creation window appears, click **Yes** to continue.

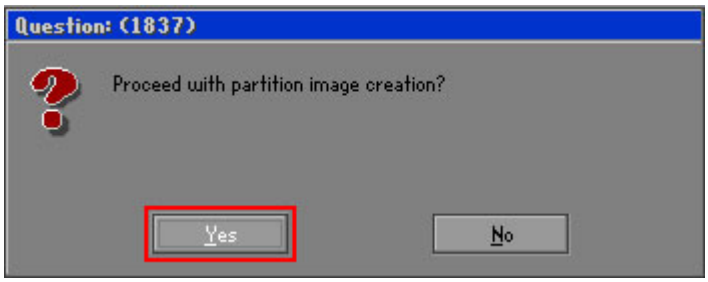


Figure B-18: Image Creation Confirmation

Step 10: The Symantec Ghost starts to create the factory default image (**Figure B-19**).

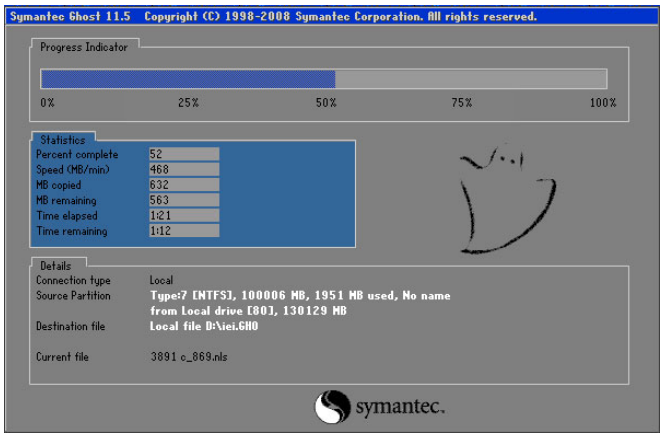


Figure B-19: Image Creation Complete

Step 11: When the image creation completes, a screen prompts as shown in **Figure B-20**. Click **Continue** and close the Ghost window to exit the program.

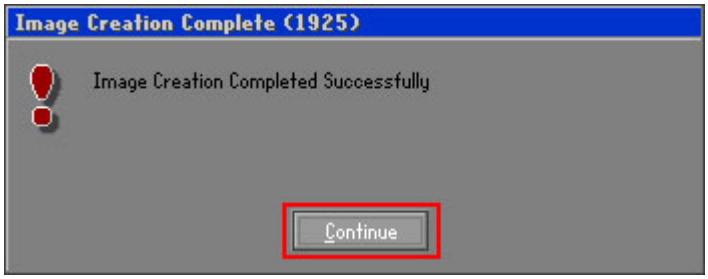


Figure B-20: Image Creation Complete

Step 12: The recovery tool main menu window is shown as below. Press any key to reboot the system.

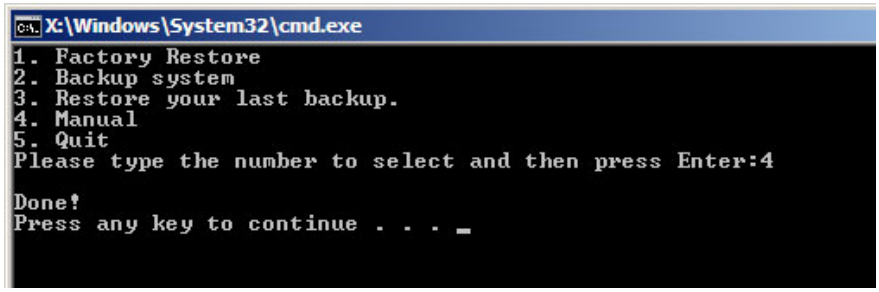


Figure B-21: Press Any Key to Continue

B.3 Auto Recovery Setup Procedure

The auto recovery function allows a system to automatically restore from the factory default image after encountering a Blue Screen of Death (BSoD) or a hang for around 10 minutes. To use the auto recovery function, follow the steps described in the following sections.

CAUTION:

The auto recovery function can only run on a Microsoft Windows system with the following OS versions:

- Windows 2000
- Windows XP
- Windows Vista
- Windows 7
- Windows XP Embedded
- Windows Embedded Standard 7

CAUTION:

The setup procedure may include a step to create a factory default image. It is suggested to configure the system to a factory default environment before the configuration, including driver and application installations.

Step 1: Follow the steps described in **Section B.2.1 ~ Section B.2.3** to setup BIOS, create partitions and install operating system.

Step 2: Install the auto recovery utility into the system by double clicking the **Utility/AUTORECOVERY-SETUP.exe** in the One Key Recovery CD. This utility MUST be installed in the system, otherwise, the system will automatically restore from the factory default image every ten (10) minutes.

Figure B-22: Auto Recovery Utility

Step 3: **Disable the automatically restart function before creating the factory default image**. Go to: My Computer → Properties → Advanced. Click the Settings button of Startup and Recovery. Deselect “Automatically restart”. Click OK to save the settings and exit. (See Figure B-23)

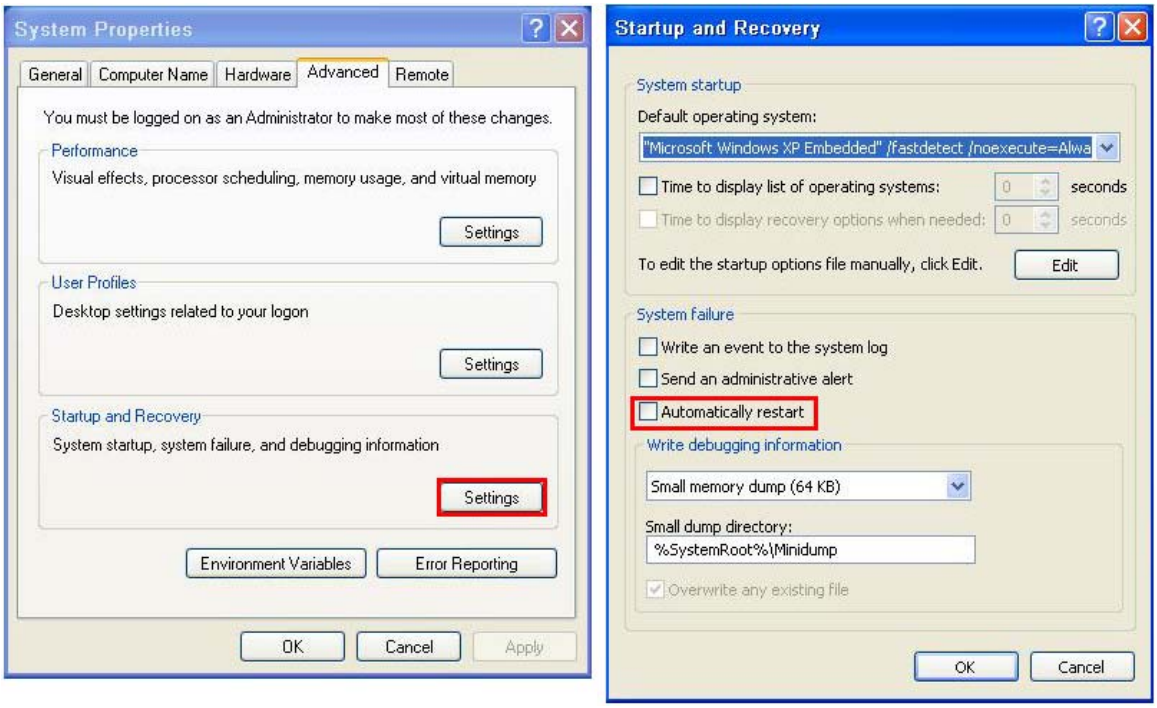


Figure B-23: Disable Automatically Restart

Step 4: Reboot the system from the recovery CD. When prompted, press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient!

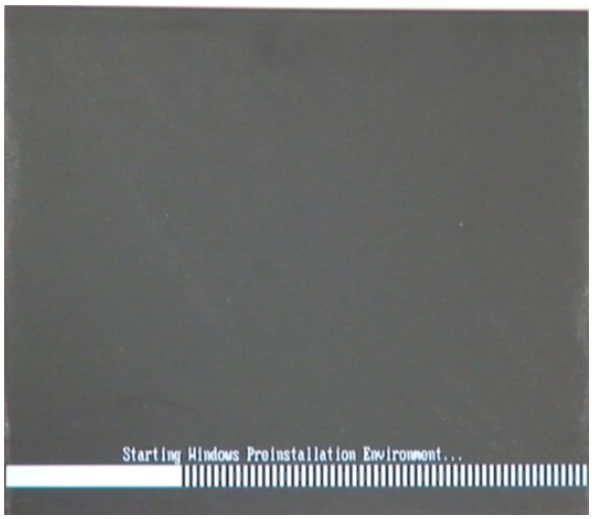


Figure B-24: Launching the Recovery Tool

Step 5: When the recovery tool setup menu appears, press <**4**> then <Enter>.

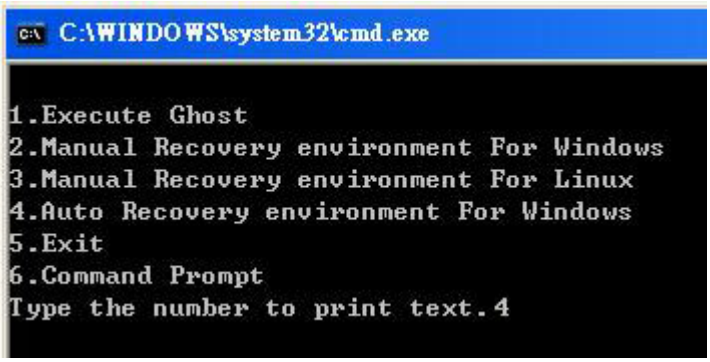


Figure B-25: Auto Recovery Environment for Windows

Step 6: The Symantec Ghost window appears and starts configuring the system to build an auto recovery partition. In this process the partition created for recovery files in **Section B.2.2** is hidden and the auto recovery tool is saved in this partition.

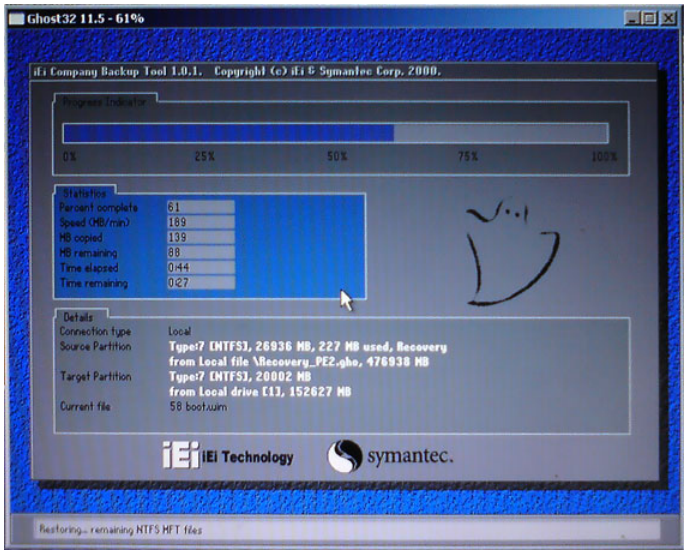


Figure B-26: Building the Auto Recovery Partition

Step 7: After completing the system configuration, the following message prompts to confirm whether to create a factory default image. Type **Y** to have the system create a factory default image automatically. Type **N** within 6 seconds to skip this process (The default option is YES). It is suggested to choose YES for this option.

Figure B-27: Factory Default Image Confirmation

Step 8: The Symantec Ghost starts to create the factory default image (**Figure B-28**).

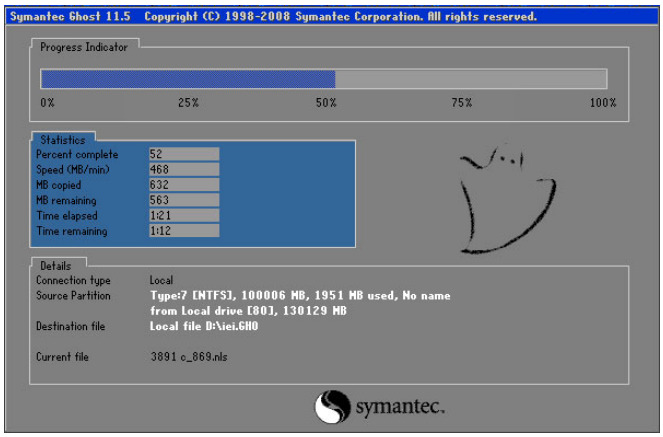


Figure B-28: Image Creation Complete

Step 9: After completing the system configuration, press any key in the following window to restart the system.

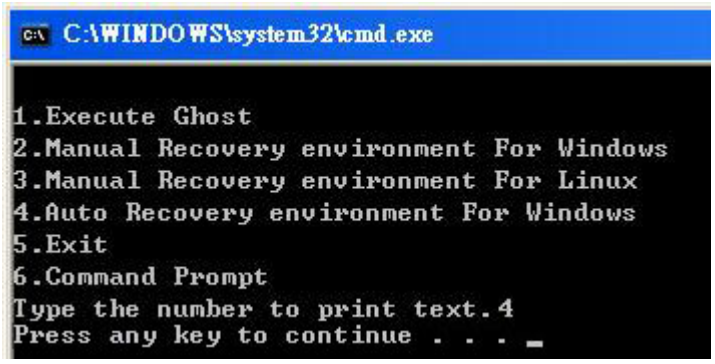
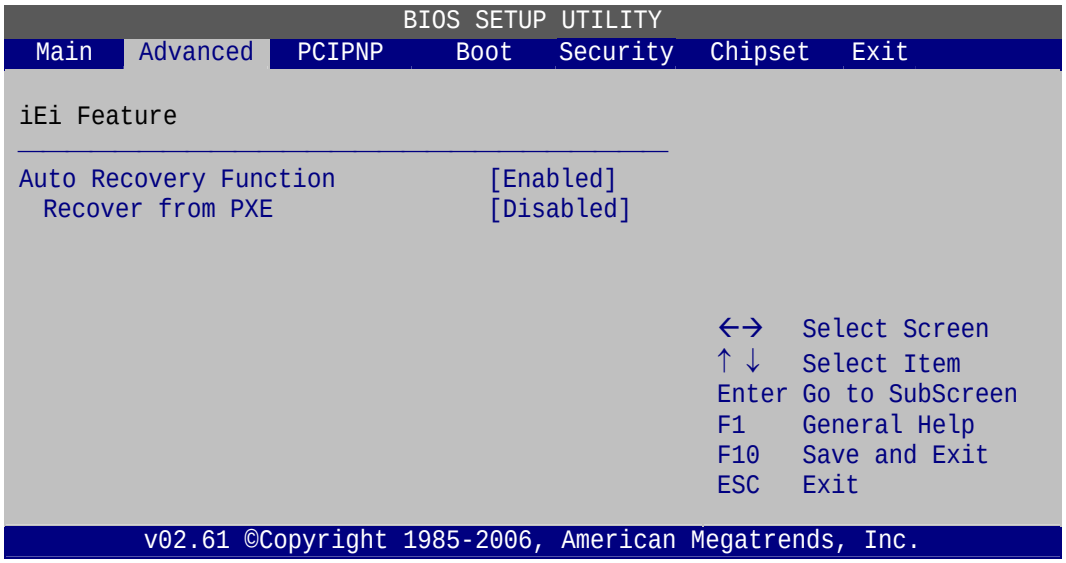


Figure B-29: Press any key to continue

Step 10: Eject the One Key Recovery CD and restart the system.

Step 11: Press the <**DELETE**> key as soon as the system is turned on to enter the BIOS.

Step 12: Enable the Auto Recovery Function option (**Advanced → iEi Feature → Auto Recovery Function**).



BIOS Menu 21: IEI Feature

Step 13: Save changes and restart the system. If the system encounters a Blue Screen of Death (BSoD) or a hang for around 10 minutes, it will automatically restore from the factory default image.

B.4 Setup Procedure for Linux

The initial setup procedure for Linux system is mostly the same with the procedure for Microsoft Windows. Please follow the steps below to setup recovery tool for Linux OS.

Step 1: **Hardware and BIOS setup**. Refer to **Section B.2.1**.

Step 2: **Install Linux operating system**. Make sure to install GRUB (v0.97 or earlier) MBR type and Ext3 partition type. Leave enough space on the hard drive to create the recover partition later.

NOTE:

If the Linux OS is not installed with GRUB (v0.97 or earlier) and Ext3, the Symantec Ghost may not function properly.

While installing Linux OS, please create two partitions:

- Partition 1: **/**
- Partition 2: **SWAP**

NOTE:

Please reserve enough space for partition 3 for saving recovery images.

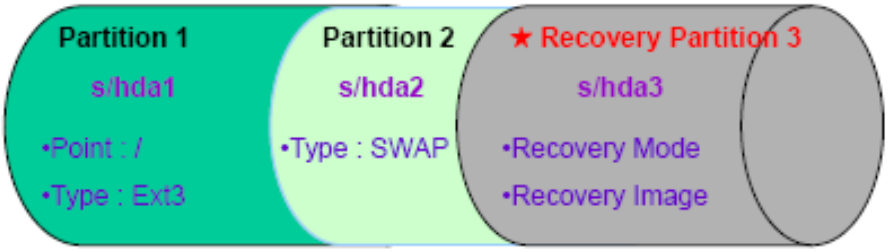


Figure B-30: Partitions for Linux

Step 3: **Create a recovery partition**. Insert the recovery CD into the optical disk drive. Follow **Step 1** ~ **Step 3** described in **Section B.2.2**. Then type the following commands (marked in red) to create a partition for recovery images.

system32>diskpart

DISKPART>list vol

DISKPART>sel disk 0

DISKPART>create part pri size= ___

DISKPART>assign letter=N

DISKPART>exit

system32>format N: /fs:ntfs /q /v:Recovery /y

system32>exit

Step 4: **Build the recovery partition**. Press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient. When the recovery tool setup menu appears, type <**3**> and press <Enter> (**Figure B-31**). The Symantec Ghost window appears and starts configuring the system to build a

recovery partition. After completing the system configuration, press any key to reboot the system. Eject the recovery CD.

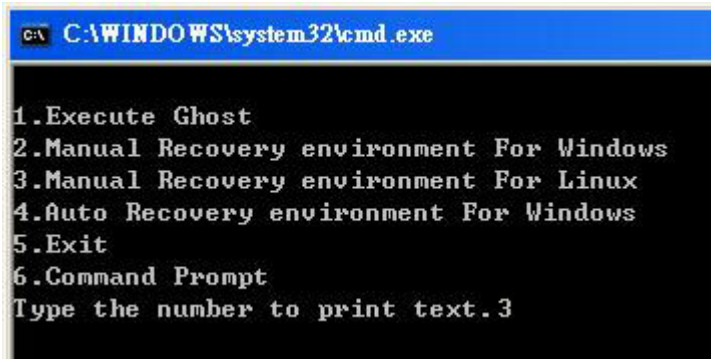


Figure B-31: Manual Recovery Environment for Linux

Step 5: **Access the recovery tool main menu by modifying the "menu.lst"**. To first access the recovery tool main menu, the menu.lst must be modified. In Linux, enter Administrator (root). When prompt appears, type:

cd /boot/grub

vi menu.lst

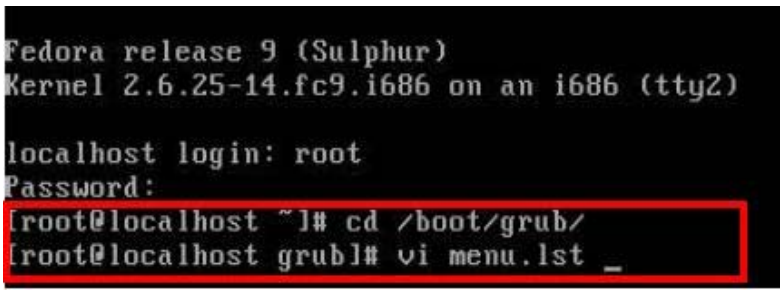
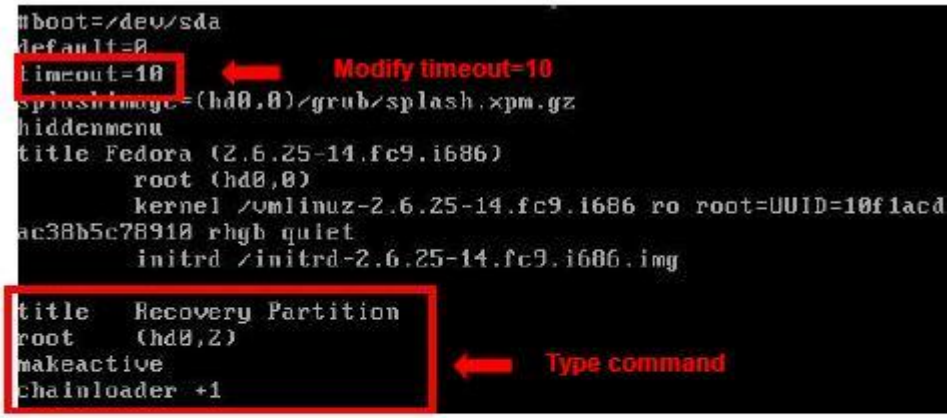


Figure B-32: Access menu.lst in Linux (Text Mode)

Step 6: Modify the menu.lst as shown below.



- Type command:

  title Recovery Partition

  root (hd0,2)

  makeactive

  chainloader +1

Step 7: The recovery tool menu appears. (**Figure B-33**)

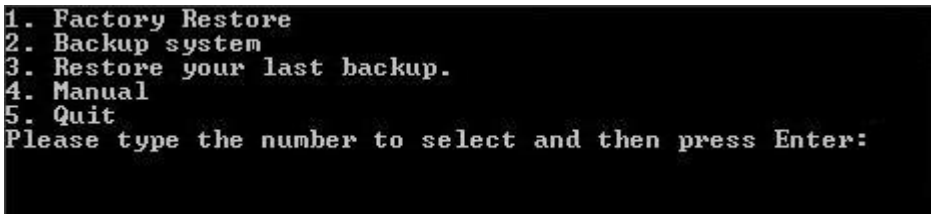


Figure B-33: Recovery Tool Menu

Step 8: **Create a factory default image**. Follow **Step 2** ~ **Step 12** described in **Section B.2.5** to create a factory default image.

B.5 Recovery Tool Functions

After completing the initial setup procedures as described above, users can access the recovery tool by pressing <**F3**> while booting up the system. However, if the setup procedure in Section B.3 has been completed and the auto recovery function is enabled, the system will automatically restore from the factory default image without pressing the F3 key. The recovery tool main menu is shown below.

Figure B-34: Recovery Tool Main Menu

The recovery tool has several functions including:

1. **Factory Restore**: Restore the factory default image (iei.GHO) created in Section B.2.5.
2. **Backup system**: Create a system backup image (iei_user.GHO) which will be saved in the hidden partition.
3. **Restore your last backup**: Restore the last system backup image
4. **Manual**: Enter the Symantec Ghost window to configure manually.
5. **Quit**: Exit the recovery tool and restart the system.

WARNING:

Please do not turn off the system power during the process of system recovery or backup.

WARNING:

All data in the system will be deleted during the system recovery. Please backup the system files before restoring the system (either Factory Restore or Restore Backup).

B.5.1 Factory Restore

To restore the factory default image, please follow the steps below.

Step 1: Type <**1**> and press <**Enter**> in the main menu.

Step 2: The Symantec Ghost window appears and starts to restore the factory default. A factory default image called **iei.GHO** is created in the hidden Recovery partition.

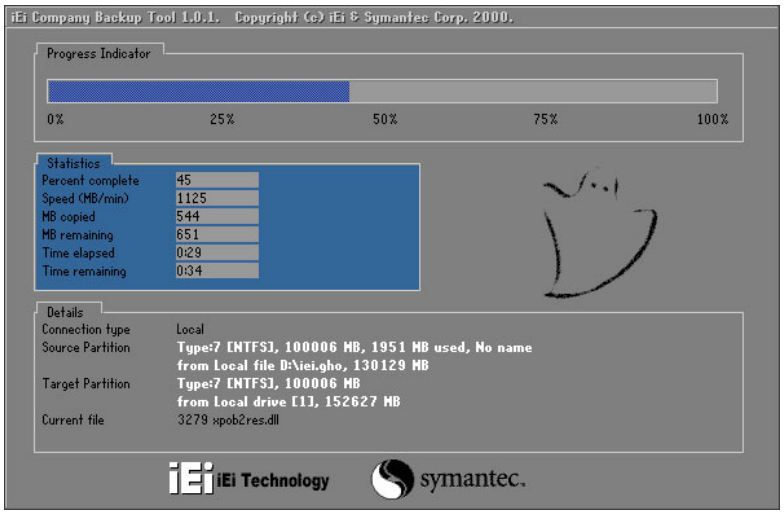


Figure B-35: Restore Factory Default

Step 3: The screen shown in **Figure B-36** appears when completed. Press any key to reboot the system.

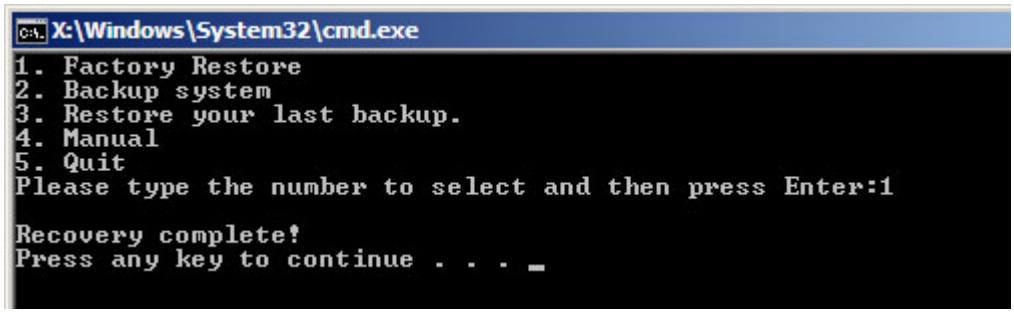


Figure B-36: Recovery Complete Window

B.5.2 Backup System

To backup the system, please follow the steps below.

Step 1: Type <**2**> and press <**Enter**> in the main menu.

Step 2: The Symantec Ghost window appears and starts to backup the system. A backup image called **iei_user.GHO** is created in the hidden Recovery partition.

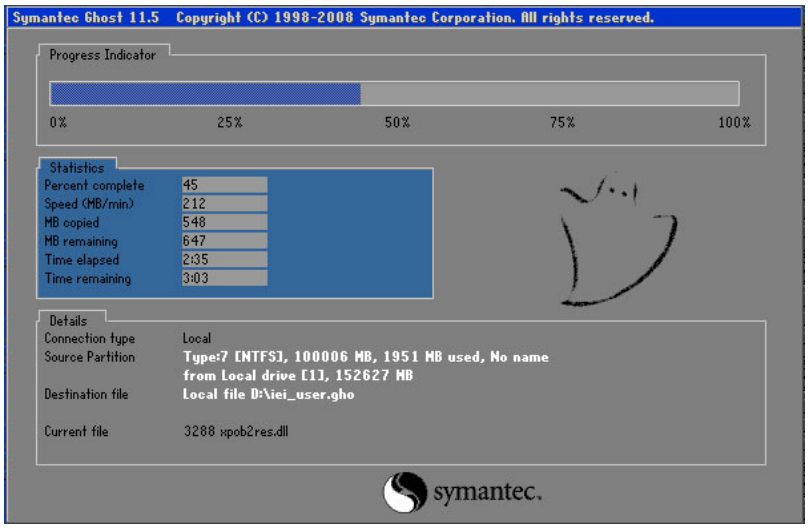


Figure B-37: Backup System

Step 3: The screen shown in **Figure B-38** appears when system backup is complete. Press any key to reboot the system.

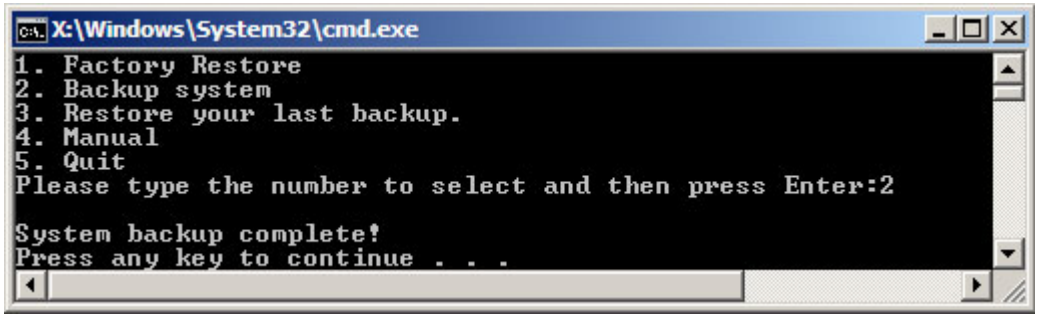


Figure B-38: System Backup Complete Window

B.5.3 Restore Your Last Backup

To restore the last system backup, please follow the steps below.

Step 1: Type <**3**> and press <**Enter**> in the main menu.

Step 2: The Symantec Ghost window appears and starts to restore the last backup image (iei_user.GHO).

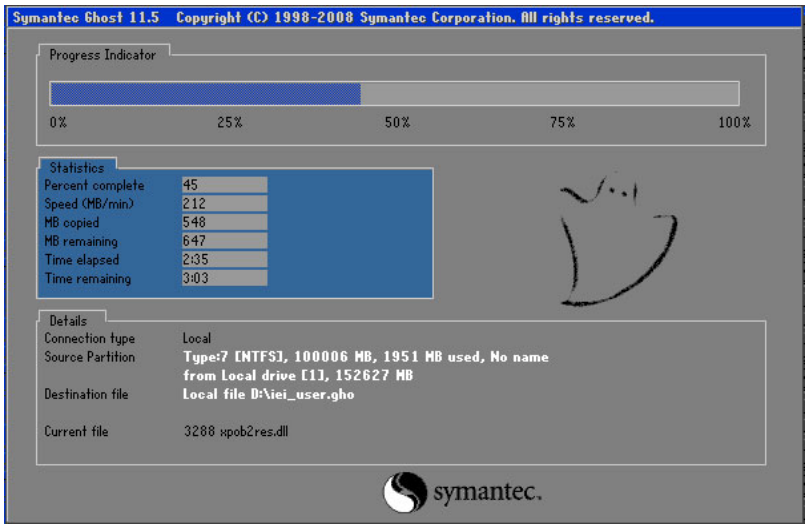


Figure B-39: Restore Backup

Step 3: The screen shown in **Figure B-40** appears when backup recovery is complete. Press any key to reboot the system.

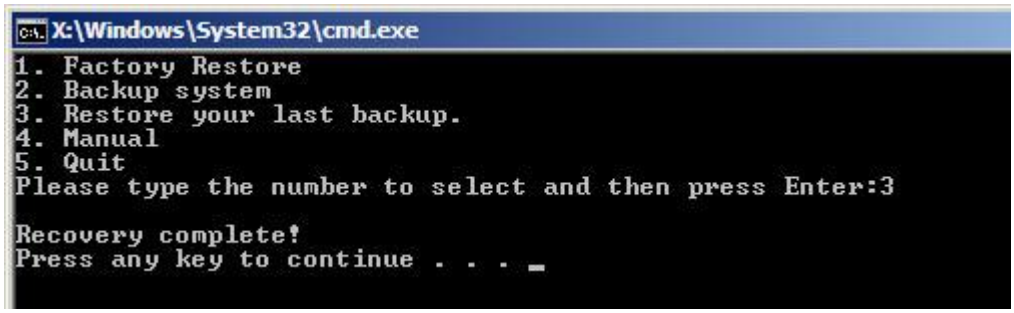


Figure B-40: Restore System Backup Complete Window

B.5.4 Manual

To restore the last system backup, please follow the steps below.

Step 1: Type <**4**> and press <**Enter**> in the main menu.

Step 2: The Symantec Ghost window appears. Use the Ghost program to backup or recover the system manually.

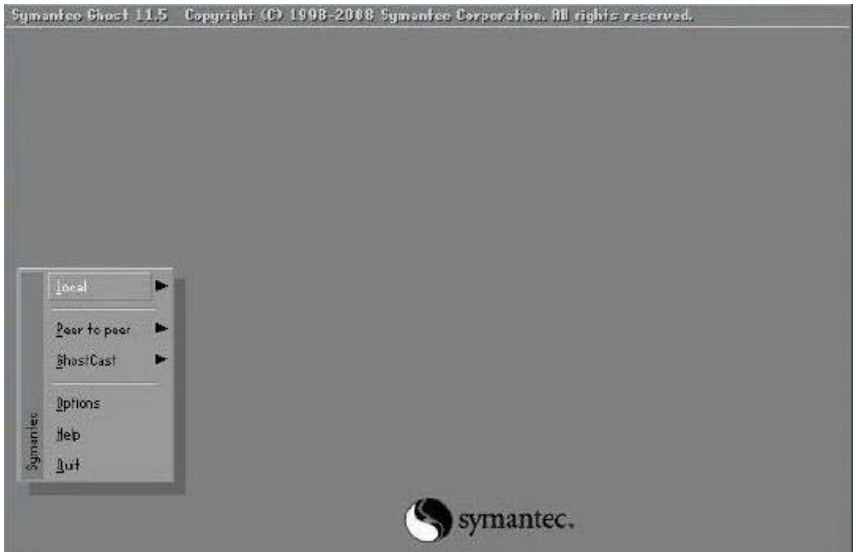
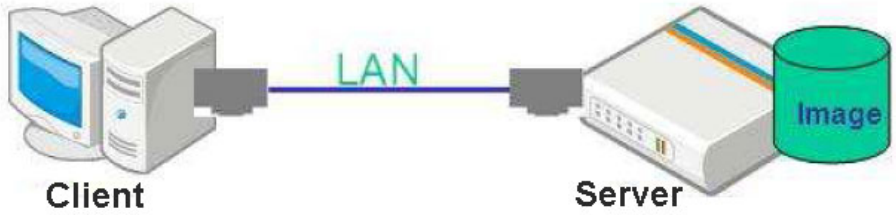


Figure B-41: Symantec Ghost Window

Step 3: When backup or recovery is completed, press any key to reboot the system.

B.6 Restore Systems from a Linux Server through LAN

The One Key Recovery allows a client system to automatically restore to a factory default image saved in a Linux system (the server) through LAN connectivity after encountering a Blue Screen of Death (BSoD) or a hang for around 10 minutes. To be able to use this function, the client system and the Linux system MUST reside in the same domain.



CAUTION:

The supported client OS includes:

- Windows 2000
- Windows XP
- Windows Vista
- Windows 7
- Windows XP Embedded
- Windows Embedded Standard 7

Prior to restoring client systems from a Linux server, a few setup procedures are required.

Step 1: Configure DHCP server settings

Step 2: Configure TFTP settings

Step 3: Configure One Key Recovery server settings

Step 4: Start DHCP, TFTP and HTTP

Step 5: Create a shared directory

Step 6: Setup a client system for auto recovery

The detailed descriptions are described in the following sections. In this document, two types of Linux OS are used as examples to explain the configuration process – CentOS 5.5 (Kernel 2.6.18) and Debian 5.0.7 (Kernel 2.6.26).

B.6.1 Configure DHCP Server Settings

Step 1: Install the DHCP

#yum install dhcp (CentOS, commands marked in red)

#apt-get install dhcp3-server (Debian, commands marked in blue)

Step 2: Confirm the operating system default settings: dhcpd.conf.

CentOS

Use the following command to show the DHCP server sample location:

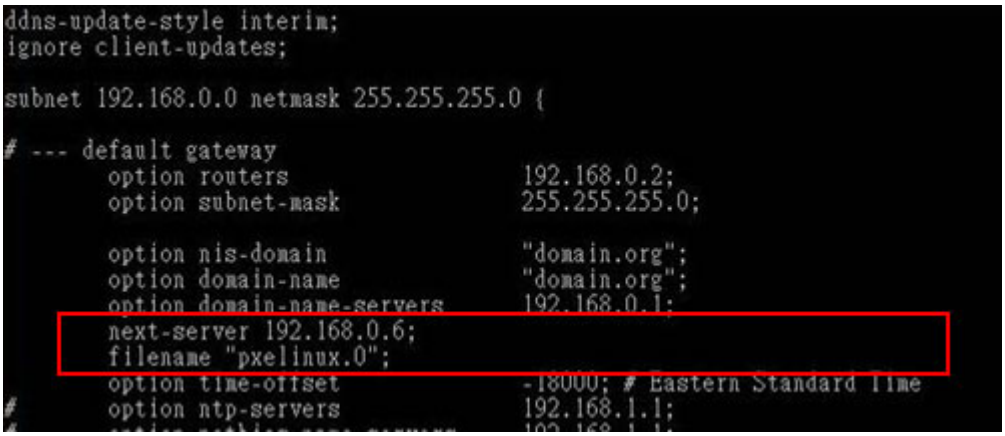
#vi /etc/dhcpd.conf

The DHCP server sample location is shown as below:

Use the following command to copy the DHCP server sample to etc/dhcpd.conf:

#cp /usr/share/doc/dhcp-3.0.5/dhcpd.conf.sample /etc/dhcpd.conf

#vi /etc/dhcpd.conf



Debian

#vi /etc/dhcpd.conf

Edit “/etc/dhcpd.conf” for your environment. For example, add

next-server PXE server IP address;

filename “pxelinux.0”;

```
ddns-update-style interim;
ignore client-updates;

subnet 192.168.0.0 netmask 255.255.255.0 {

# --- default gateway
        option routers                  192.168.0.2;
        option subnet-mask              255.255.255.0;

        option nis-domain               "domain.org";
        option domain-name              "domain.org";
        option domain-name-servers      192.168.0.1;
        next-server 192.168.0.6;
        filename "pxelinux.0";
        option time-offset              -18000; # Eastern Standard Time
#       option ntp-servers              192.168.1.1;
```

B.6.2 Configure TFTP Settings

Step 1: Install the tftp, httpd and syslinux.

#yum install tftp-server httpd syslinux (CentOS)

#apt-get install tftpd-hpa xinetd syslinux (Debian)

Step 2: Enable the TFTP server by editing the “/etc/xinetd.d/tftp” file and make it use the remap file. The “-vvv” is optional but it could definitely help on getting more information while running the remap file. For example:

CentOS

#vi /etc/xinetd.d/tftp

Modify:

disable = no

server_args = -s /tftpboot –m /tftpboot/tftpd.remap -vvv_

```
{
        socket_type             = dgram
        protocol                = udp
        wait                    = yes
        user                    = root
        server                  = /usr/sbin/in.tftpd
        server_args             = -s /tftpboot -m /tftpboot/tftpd.remap -vvv
        disable                 = no
        per_source              = 11
        cps                     = 100 2
        flags                   = IPv4
```

Debian

Replace the TFTP settings from “inetd” to “xinetd” and annotate the “inetd” by adding “#”.

#vi /etc/inetd.conf

Modify: #tftp dgram udp wait root /usr/sbin..... (as shown below)

```
#:BOOT: TFTP service is provided primarily for booting.  Most sites
#       run this only on machines acting as "boot servers."

#tftp           dgram   udp     wait    root  /usr/sbin/in.tftpd /usr/sbin/in.tftpd -s
 /var/lib/tftpboot
```

#vi /etc/xinetd.d/tftp

```
        socket_type             = dgram
        protocol                = udp
        wait                    = yes
        user                    = root
        server                  = /usr/sbin/in.tftpd
        server_args             = -s /tftpboot -m /tftpboot/tftpd.remap -vvv
        disable                 = no
        per_source              = 11
        cps                     = 100 2
        flags                   = IPv4
```

B.6.3 Configure One Key Recovery Server Settings

Step 1: Copy the **Utility/RECOVERYR10.TAR.BZ2** package from the One Key Recovery CD to the system (server side).

Step 2: Extract the recovery package to /.

#cp RecoveryR10.tar.bz2 /

#cd /

#tar –xvjf RecoveryR10.tar.bz2

Step 3: Copy “pxelinux.0” from “syslinux” and install to “/tftboot”.

#cp /usr/lib/syslinux/pxelinux.0 /tftpboot/

B.6.4 Start the DHCP, TFTP and HTTP

Start the DHCP, TFTP and HTTP. For example:

CentOS

#service xinetd restart

#service httpd restart

#service dhcpd restart

Debian

#/etc/init.d/xinetd reload

#/etc/init.d/xinetd restart

#/etc/init.d/dhcp3-server restart

B.6.5 Create Shared Directory

Step 1: Install the samba.

#yum install samba

Step 2: Create a shared directory for the factory default image.

#mkdir /share

#cd /share

#mkdir /image

#cp iei.gho /image

WARNING:

The file name of the factory default image must be **iei.gho**.

Step 3: Confirm the operating system default settings: smb.conf.

#vi /etc/samba/smb.conf

Modify:

[image]

comment = One Key Recovery

path = /share/image

browseable = yes

writable = yes

public = yes

create mask = 0644

directory mask = 0755

Step 4: Edit “/etc/samba/smb.conf” for your environment. For example:

```
# "security = user" is always a good idea. This will require a Unix account
# in this server for every user accessing the server. See
# /usr/share/doc/samba-doc/htmldocs/Samba3-HOWTO/ServerType.html
# in the samba-doc package for details.
   security = share
```

```
[image]
   comment = One Key Recovery
   path = /share/image
   browseable = yes
   writable = yes
   public = yes
   create mask = 0644
   directory mask = 0755
```

Step 5: Modify the hostname

#vi /etc/hostname

Modify: RecoveryServer

```
RecoveryServer
~
```

B.6.6 Setup a Client System for Auto Recovery

Step 1: **Disable the automatically restart function before creating the factory default image**. Go to: My Computer → Properties → Advanced. Click the Settings button of Startup and Recovery. Deselect “Automatically restart”. Click OK to save the settings and exit. (See Figure B-23)

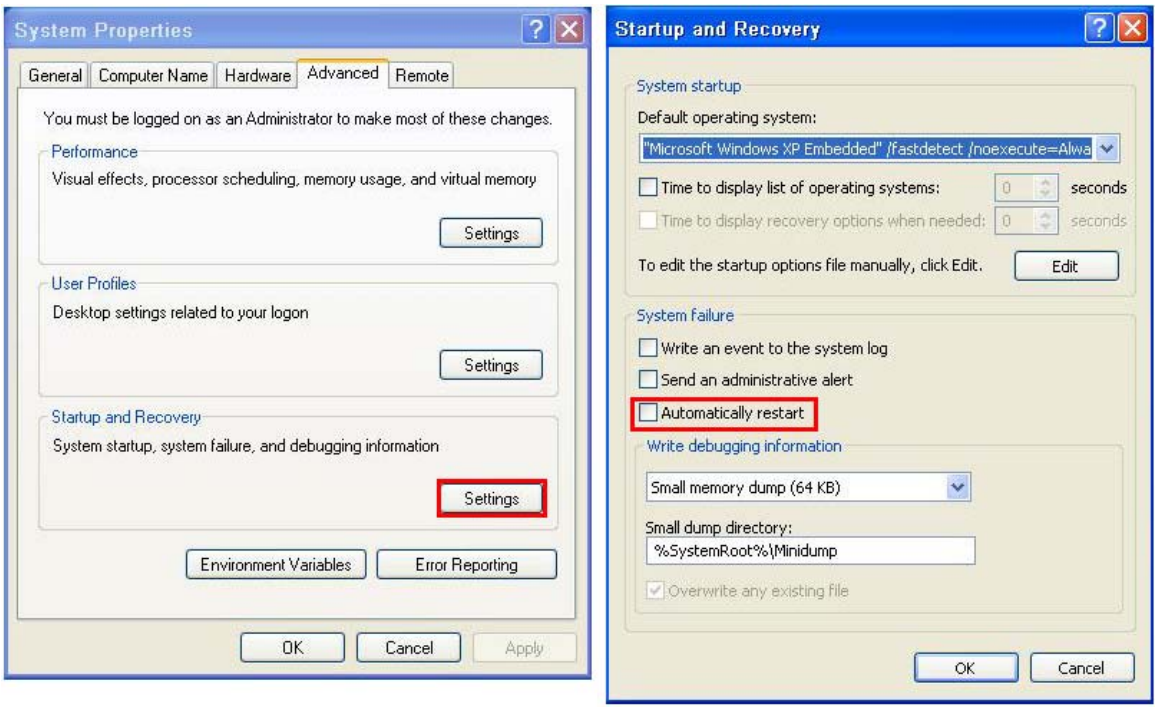


Figure B-42: Disable Automatically Restart

Step 2: Configure the following BIOS options of the client system.

Advanced → iEi Feature → Auto Recovery Function → **Enabled**

Advanced → iEi Feature → Recover from PXE → **Enabled**

Boot → Launch PXE OpROM → **Enabled**

Step 3: Continue to configure the **Boot Option Priorities** BIOS option of the client system:

Boot Option #1 → remain the default setting to boot from the original OS.

Boot Option #2 → select the boot from LAN option.

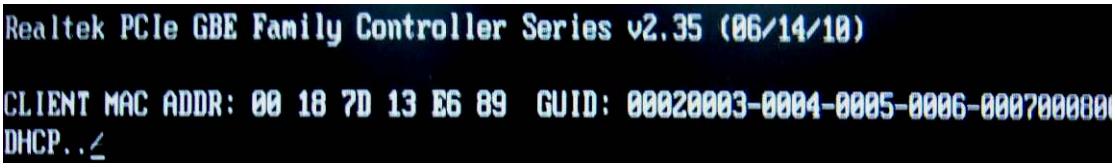
Step 4: Save changes and exit BIOS menu.

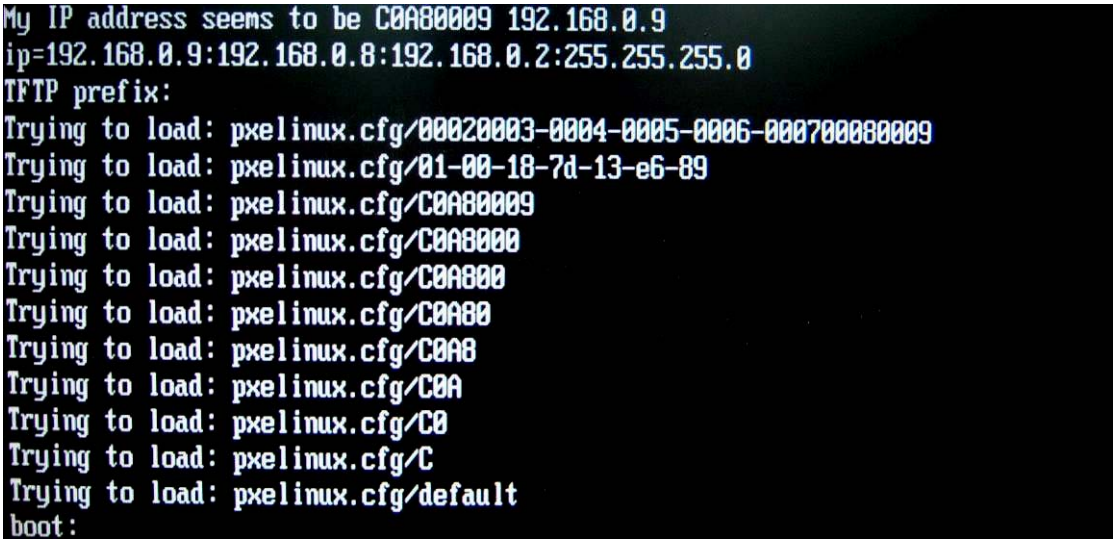
Exit → **Save Changes and Exit**

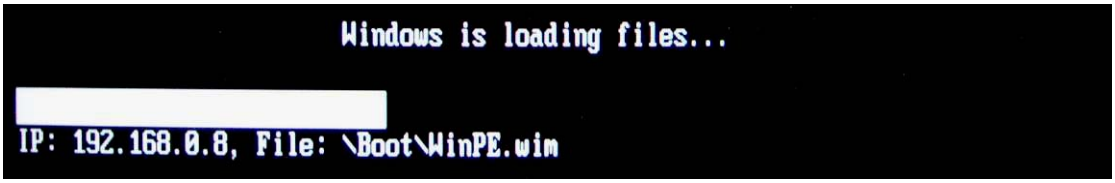
Step 5: Install the auto recovery utility into the system by double clicking the **Utility/AUTORECOVERY-SETUP.exe** in the One Key Recovery CD. This utility

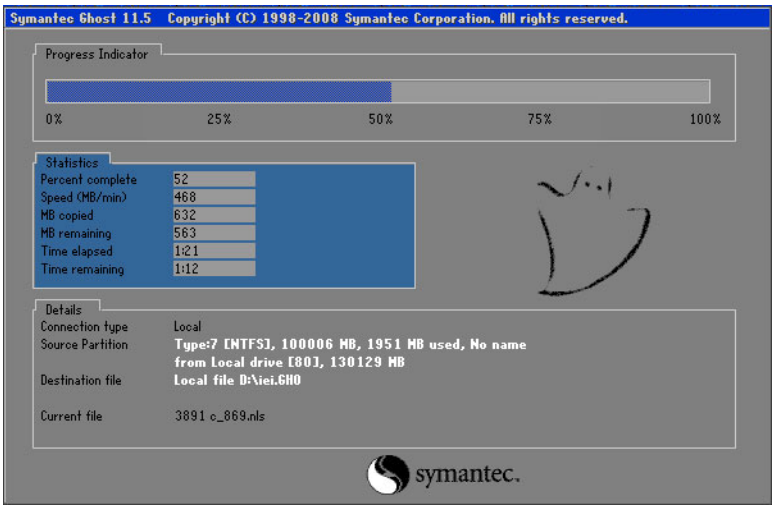
MUST be installed in the system, otherwise, the system will automatically restore from the factory default image every ten (10) minutes.

Step 6: Restart the client system from LAN. If the system encounters a Blue Screen of Death (BSoD) or a hang for around 10 minutes, it will automatically restore from the factory default image. The following screens will show when the system starts auto recovering.









NOTE:

A firewall or a SELinux is not in use in the whole setup process described above. If there is a firewall or a SELinux protecting the system, modify the configuration information to accommodate them.

B.7 Other Information

B.7.1 Using AHCI Mode or ALi M5283 / VIA VT6421A Controller

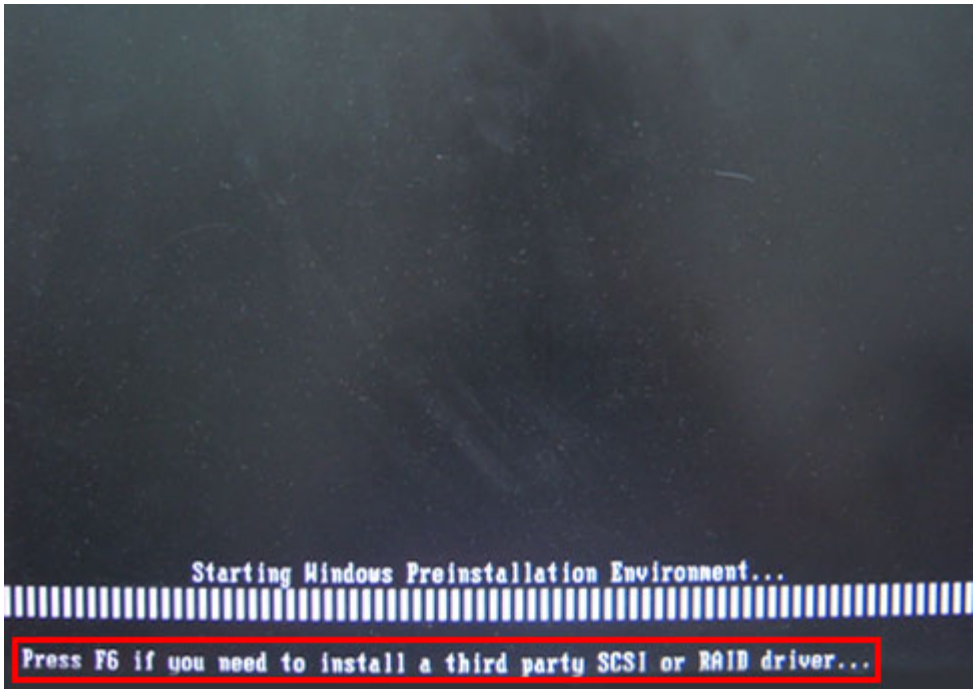
When the system uses AHCI mode or some specific SATA controllers such as ALi M5283 or VIA VT6421A, the SATA RAID/AHCI driver must be installed before using one key recovery. Please follow the steps below to install the SATA RAID/AHCI driver.

Step 1: Copy the SATA RAID/AHCI driver to a floppy disk and insert the floppy disk into a USB floppy disk drive. The SATA RAID/AHCI driver must be especially designed for the on-board SATA controller.

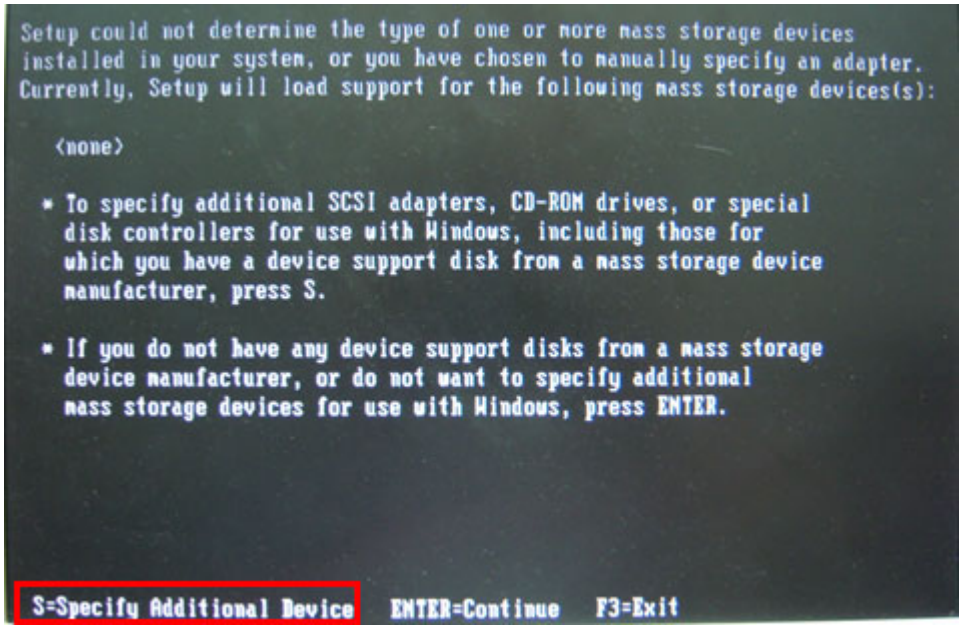
Step 2: Connect the USB floppy disk drive to the system.

Step 3: Insert the One Key Recovery CD into the system and boot the system from the CD.

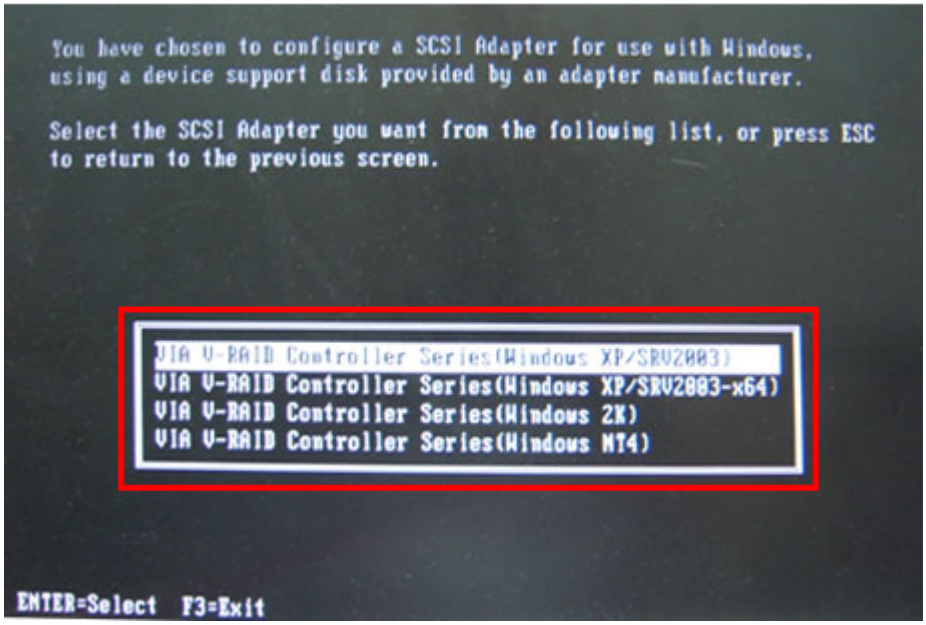
Step 4: When launching the recovery tool, press <**F6**>.



Step 5: When the following window appears, press <**S**> to select “Specify Additional Device”.



Step 6: In the following window, select a SATA controller mode used in the system. Then press <**Enter**>. The user can now start using the SATA HDD.



Step 7: After pressing <Enter>, the system will get into the recovery tool setup menu. Continue to follow the setup procedure from **Step 4** in **Section B.2.2 Create Partitions** to finish the whole setup process.

B.7.2 System Memory Requirement

To be able to access the recovery tool by pressing <**F3**> while booting up the system, please make sure to have enough system memory. The minimum memory requirement is listed below.

- **Using Award BIOS**: 128 MB system memory
- **Using AMI BIOS**: 512 MB system memory.

Appendix

C

Terminology

AC '97	Audio Codec 97 (AC'97) refers to a codec standard developed by Intel® in 1997.
ACPI	Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.
AHCI	Advanced Host Controller Interface (AHCI) is a SATA Host controller register-level interface.
ATA	The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.
ARMD	An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.
ASKIR	Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude ("volume") of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.
BIOS	The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user
CODEC	The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.
CompactFlash®	CompactFlash® is a solid-state storage device. CompactFlash® devices use flash memory in a standard size enclosure. Type II is thicker than Type I, but a Type II slot can support both types.
CMOS	Complimentary metal-oxide-conductor is an integrated circuit used in chips like static RAM and microprocessors.
COM	COM refers to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal computer is usually a male DB-9 connector.
DAC	The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.

DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
DIO	The digital inputs and digital outputs are general control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
EIDE	Enhanced IDE (EIDE) is a newer IDE interface standard that has data transfer rates between 4.0 MBps and 16.6 MBps.
EIST	Enhanced Intel® SpeedStep Technology (EIST) allows users to modify the power consumption levels and processor performance through application software. The application software changes the bus-to-core frequency ratio and the processor core voltage.
FSB	The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.
GbE	Gigabit Ethernet (GbE) is an Ethernet version that transfers data at 1.0 Gbps and complies with the IEEE 802.3-2005 standard.
GPIO	General purpose input
HDD	Hard disk drive (HDD) is a type of magnetic, non-volatile computer storage device that stores digitally encoded data.
ICH	The Input/Ouput Controll Hub (ICH) is an Intel® Southbridge chipset.
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.

LCD	Liquid crystal display (LCD) is a flat, low-power display device that consists of two polarizing plates with a liquid crystal panel in between.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
RAM	Random Access Memory (RAM) is volatile memory that loses data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gbps and the SATA II bus has data transfer speeds of up to 3.0 Gbps.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.
USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12Mbps data transfer rates and USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

D

Digital I/O Interface

D.1 Introduction

The DIO connector on the NANO-HM651 is interfaced to GPIO ports on the Super I/O chipset. The DIO has both 4-bit digital inputs and 4-bit digital outputs. The digital inputs and digital outputs are generally control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.

NOTE:

For further information, please refer to the datasheet for the Super I/O chipset.

D.2 DIO Connector Pinouts

The following table describes how the DIO connector pins are connected to the Super I/O GPIO port 1.

Pin	Description	Super I/O Pin	Super I/O Pin Description
1	Ground	N/A	N/A
2	VCC	N/A	N/A
3	Output 3	GP27	General purpose I/O port 2 bit 7.
4	Output 2	GP26	General purpose I/O port 2 bit 6.
5	Output 1	GP25	General purpose I/O port 2 bit 5.
6	Output 0	GP24	General purpose I/O port 2 bit 4.
7	Input 3	GP23	General purpose I/O port 2 bit 3.
8	Input 2	GP22	General purpose I/O port 2 bit 2
9	Input 1	GP21	General purpose I/O port 2 bit 1
10	Input 0	GP20	General purpose I/O port 2 bit 0

Table D-1: Digital I/O Connector Pinouts

D.3 Assembly Language Samples

D.3.1 Enable the DIO Input Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O input functions is listed below.

MOV	**AX, 6F08H**	Sets the digital port as input
INT	**15H**	Initiates the INT 15H BIOS call

D.3.2 Enable the DIO Output Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O output functions is listed below.

MOV	**AX, 6F09H**	Sets the digital port as output
MOV	**BL, 09H**	
INT	**15H**	Initiates the INT 15H BIOS call

Appendix

E

Watchdog Timer

NOTE:

The following discussion applies to DOS. Contact IEI support or visit the IEI website for drivers for other operating systems.

The Watchdog Timer is a hardware-based timer that attempts to restart the system when it stops working. The system may stop working because of external EMI or software bugs. The Watchdog Timer ensures that standalone systems like ATMs will automatically attempt to restart in the case of system problems.

A BIOS function call (INT 15H) is used to control the Watchdog Timer.

INT 15H:

AH – 6FH Sub-function:	
AL – 2:	Sets the Watchdog Timer's period.
BL:	Time-out value (Its unit-second is dependent on the item "Watchdog Timer unit select" in CMOS setup).

Table E-1: AH-6FH Sub-function

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. When the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

NOTE:

The Watchdog Timer is activated through software. The software application that activates the Watchdog Timer must also deactivate it when closed. If the Watchdog Timer is not deactivated, the system will automatically restart after the Timer has finished its countdown.

EXAMPLE PROGRAM:

```
; INITIAL TIMER PERIOD COUNTER

;
W_LOOP:
;

        MOV     AX, 6F02H       ;setting the time-out value
        MOV     BL, 30          ;time-out value is 48 seconds
        INT     15H

;
; ADD THE APPLICATION PROGRAM HERE
;

        CMP     EXIT_AP, 1      ;is the application over?
        JNE     W_LOOP          ;No, restart the application

        MOV     AX, 6F02H       ;disable Watchdog Timer
        MOV     BL, 0           ;
        INT     15H

;
; EXIT ;
```

Appendix

F

Hazardous Materials Disclosure

F.1 Hazardous Materials Disclosure Table for IPB Products Certified as RoHS Compliant Under 2002/95/EC Without Mercury

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated “Environmentally Friendly Use Period” (EFUP). This is an estimate of the number of years that these substances would “not leak out or undergo abrupt change.” This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the table on the next page.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	X	O	O	O	O	X
Display	X	O	O	O	O	X
Printed Circuit Board	X	O	O	O	O	X
Metal Fasteners	X	O	O	O	O	O
Cable Assembly	X	O	O	O	O	X
Fan Assembly	X	O	O	O	O	X
Power Supply Assemblies	X	O	O	O	O	X
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有"环境友好使用期限"的标签，此期限是估算这些物质"不会有泄漏或突变"的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	X	O	O	O	O	X
显示	X	O	O	O	O	X
印刷电路板	X	O	O	O	O	X
金属螺帽	X	O	O	O	O	O
电缆组装	X	O	O	O	O	X
风扇组装	X	O	O	O	O	X
电力供应组装	X	O	O	O	O	X
电池	O	O	O	O	O	O
O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。 X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。						